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Investigating the appropriateness and extent of artificial intelligence (AI) for pedagogic purposes: a case study of Coventry University and the University of Wales Trinity St David (UWTSD) in higher education, UK"

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DECLARATION

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed M Masud

Date 30/07/25

STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated. Where correction services have been used the extent and nature of the correction is clearly marked in a footnote(s). Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

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Abstract

In higher education, Artificial Intelligence (AI) plays a crucial role in improving teaching and student learning by introducing innovation of technologies into pedagogical practices. There is developing evidence indicating that AI has a key role in increasing student learning and teaching by associating innovative technologies into pedagogical practices. A persistent argument about the extent, appropriateness, and relevance of AI's influence in education, especially in terms of its pedagogical effectiveness, ethical implementation, and effect on conventional teaching methodologies. This research study focused on evaluating to what extent AI technology influences the educational strategies in UK-based higher education institutions, such as Coventry University (CU) and the University of Wales Trinity St. David (UWTSD). The effectiveness of AI integration in influencing creativity, digital literacy, and academic performance was evaluated in this study. In addition, perceived benefits and associated challenges with AI usage in educational institutions were also investigated. This research study identified the best practices, challenges, and future research directions for the implementation of AI technologies in pedagogic practices based on a comparison of strategies across these two educational institutions.

A mixed-method study (i.e. qualitative and quantitative methods) was incorporated into the study to derive relevant, comprehensive insights. In the survey questionnaire analysis, CU and UWTSD were participants, and data was collected from them using surveys. The research determined the relationships between AI adoption and educational parameters, such as digital literacy, student engagement, academic performance, and creativity; data analysis was performed using the IBM SPSS 26.0 tool and Microsoft excel. However, descriptive statistics and inferential analysis, including correlation and multiple regression analyses, were performed. to identify the themes regarding the transformative role of AI in teaching and student learning while addressing both benefits and challenges. Thematic analysis was conducted to assess interview data using NVivo 14.0 in alignment with the research objectives.

The result revealed that Quantitative results revealed AI has limited impacts on creativity and shows no significant direct effect on academic performance, digital literacy, or student engagement, though a small positive link with learning outcomes was identified. Moderation analysis indicated that both challenges and benefits linked to AI can enhance creativity and digital literacy. Qualitative results highlighted varied AI tool usage, training disparities, and governance differences between the universities.

Recommendations include structured training, ethical AI policies, and strategic planning to support AI adoption and improve teaching and learning outcomes.

The findings of the interview disclosed that AI tools improved teaching strategies and student learning outcomes based on supportive assessments, personalised resources, and feedback strategies. They also revealed that challenges like ethical concerns, technological adoption, and resource limitations limited the full integration of AI. CU adopted structured training and policies during AI adoption, while UWTSD focused on accessibility, resource allocation, and ethical concerns. The findings indicated the distinct approaches between these two institutions.

The research concludes that AI has limited impacts on creativity and shows no significant direct effect on academic performance, digital literacy, or student engagement, though a small positive link with learning outcomes was identified in both CU and UWTSD. However, qualitative findings revealed that AI-driven tools were found to have potential to improve student motivation and academic performance, with CU reporting higher levels of engagement compared to UWTSD. This indicates that AI technologies can create personalised and engaging learning environments. However, the study also identified challenges in implementation, including ethical concerns and limited resources. To address this, UK higher education institutions must develop balanced strategies that leverage AI benefits without undermining creativity. The findings underscore the importance of aligning AI adoption with institutional goals and establishing frameworks to enhance its educational impact.

Future research should investigate the long-term effects of AI on academic outcomes and explore influencing factors. Although this study focused on UK institutions, AI integration experiences may differ globally. Developing countries, for instance, may face challenges due to educational policies, access to digital resources, and infrastructure. Comparative international studies would provide broader perspectives, identifying region-specific challenges and opportunities. Ultimately, such insights can guide institutions and policymakers in adopting AI effectively.

Keywords: Artificial Intelligence, CU and UWTSD, Appropriateness, Extent, Integration, Higher Education, Academic Performance, Student Engagement, Creativity.

Table of Contents

Abstract.....3

Chapter One: introduction.....21

1.1. Introduction..... 21

1.2. Background and context 21

1.1.1: Competitive advantages of AI in the pedagogy approach in UK higher education ... 26

1.2.1. Educational Use of Artificial Intelligence 28

1.2.2. Artificial Intelligence-Based Scaffolding in STEM Education 30

1.2.3. Teachers' Perception of Using Artificial Intelligence 32

1.2.4. The Roles of Teachers in AI-based Education 33

1.2.5. The rise of artificial intelligence in higher education 34

1.2.6. Challenges of AI in higher education 37

1.1.8. Overcoming the AI pressure in higher education 40

1.2: Research Gap 41

1.3. Research aims and objectives 43

1.2.1: The objectives of this study are as follows: 43

1.4. Research Questions 44

1.5. Problem statement 44

1.6. Rationale of the Study 46

1.7. Significance and Contributions 47

1.8. Scope and Limitations 50

1.9. Outline of the Dissertation 51

1.10. Chapter Summary 52

Chapter Two: Literature Review 53

2.1. Introduction 53

2.2. AI in education and higher education and consequences 56

2.3. Artificial Intelligence Applications in Teaching and Learning 57

2.4. Theoretical Foundations of AI in Pedagogy 59

2.4.1. Resource-Based Theory 59

2.5. Pedagogical theories and models relevant to AI 61

2.6: Overview of AI applications in higher education 66

2.7: Benefits and challenges of integrating AI in pedagogic processes 70

2.7.1: Benefits 71

2.7.2: Challenges 73

2.8: Pedagogical Implications of AI 74

2.8.1: Personalised Learning Experiences 74

2.8.2: Adaptive Instruction 75

2.8.3: Enhanced Student Engagement 75

2.8.4: Data-Driven Decision-Making 75

2.9: Influence of AI on Teaching Methodologies 76

2.9.1:AI-assisted exercise can evidently improve teaching effectiveness 77

2.9.2: AI-assisted exams can evidently improve teaching effectiveness 77

2.9.3:AI-assisted assessment can evidently improve teaching effectiveness 78

2.9.4: AI-assisted management can evidently improve teaching effectiveness 78

2.10: Future Prospects of AI in Pedagogy 79

2.11: Emerging AI technologies and their potential impact on education 80

2.11.1: Visualisations and virtual learning environments (VLE) 80

2.11.2: Personalised learning systems or environments (PLS/E) 81

2.11.3: Machine learning 81

2.11.4: Intelligent tutors or agents 82

2.11.5: Expert system 83

2.11.6: Chatbot 83

2.11.7: Chat GPT 83

2.12: The role of continuous professional development for educators 84

2.13: Potential for collaborative AI research between institutions 86

2.14: AI's impact on student learning outcomes 88

2.14.1: Personalised Learning Pathways 88

2.14.2: Enhanced Engagement and Motivation 88

2.14.3: Timely and Constructive Feedback 89

2.14.4: Adaptive Assessments and Mastery-Based Learning 89

2.15: Ethical considerations and implications of using AI in education 90

2.16: Learning theories supporting the use of AI in education 91

2.16.1: Constructivism Theory 91

2.16.2: Social Learning Theory 92

2.16.3: Cognitive Load Theory 93

2.17: Pedagogical principles and AI integration 93

2.17.1: Motivation 93

2.17.2: Practical Activities 94

2.17.3: Variation 94

2.17.4: Positive Relationship 95

2.18: What AI means for teaching 95

2.18.1: Challenges and Concerns in implementing AI in Education 96

2.19: Case Study Analysis: Coventry University (CU) 98

2.19.1: Overview of CU's educational approach and infrastructure 98

2.19.2: Current applications of AI in CU's pedagogic practices 98

2.19.3: Benefits observed, and challenges faced 99

2.20: Conceptual Framework: 100

2.27: Research Hypotheses: 101

2.21: Summary 103

Chapter Three: Methodology 105

3.1. Introduction 105

3.2. Research onion 106

3.2.1: Research Philosophy 106

3.2.2: Research Approach 106

3.2.3. Methodological Choices: 107

3.2.4: Strategy: 107

3.2.5. Time Horizons: 108

3.2.6. Techniques and Procedures 108

3.2: Research philosophy 110

3.3.1. Research Philosophical Framework 110

3.2.2. Research Philosophical Paradigm 112

3.4: Research approach 117

3.4.1. Inductive Approach 117

3.4.2. Deductive Approach 118

3.4.3. Abduction Approach 120

3.4.4. Justification of the Chosen Research Approach 120

3.5. Research design 121

3.5.1. Mixed Method Research Design 121

3.5.2. Justification of the Chosen Research Design 122

3.6. Population, Sample, and Sampling techniques 124

3.7: Stakeholders' analysis 127

3.7.1: Operationalisation of stakeholder's analysis 127

3.7.2: Stakeholders in Higher education 127

3.8: Designing semi structured interview and questionnaires 129

3.9: Data collection methods 130

3.9: Data Analysis techniques 134

3.10: Coding the data 139

3.11: Time Horizon 140

3.11.1: Cross Sectional 141

3.11.2: Longitudinal 141

3.11.3: Time Horizon of the project 142

3.11.4: Triangulation 142

3.12: Data management 144

3.13: Validity and Reliability 145

3.14: Ethical consideration 147

3.15: Limitations of the methodology 149

3.16: Summary 150

Chapter Four: Findings 151

4.0: Introduction 151

4.1. Quantitative Data Findings 152

4.1.1. Descriptive Statistics 153

4.1.2. Inferential Statistics 165

4.2. Interview Data Findings 175

4.2.1. Thematic Analysis 176

4.2.2. AI Integration in Pedagogy Practices 178

4.2.3. Effect of AI on Academic Performance, Learning Outcomes, and Student Engagement 182

4.2.4. Challenges of AI Implementation in Higher Education 186

4.2.5. Outcomes and Strategies of AI Implementation 192

4.2.6. AI Implications on Traditional Learning Environment 195

4.2.7. Future Recommendations or Suggestions for AI Applications in Higher Education 198

4.3: Summary of Qualitative Analysis 201

4.4. Summary of Data Findings 202

Chapter Five: Discussion 207

5.1. Introduction 207

5.2. Integration of AI in Educational Practices at CU and UWTSD 209

5.2.1. AI Implementation Strategies 209

5.2.2. Influence of AI Integration on Educational Experience 211

5.2.3. Comparison of AI Integration Strategies between CU and UWTSD 212

5.3. Influence of AI-Powered Tools on Student Interest, Learning Outcomes, and Academic Performance 213

5.3.1. Influence on Student Interest and Engagement 214

5.3.2. Influence on Student Learning Outcomes 215

5.3.3. Impact on Academic Performance 217

5.3.4. Comparative Analysis of Best Practices and Improvement Areas for CU and UWTSD 218

5.4. Perceived Benefits and Challenges of AI Integration 219

5.4.1. Perceptions of Educators towards AI in Pedagogy 219

5.4.2. Perceptions of Students towards AI-driven Learning 220

5.4.3. Aligning Perceptions of Students and Educators with Actual Educational Outcomes 221

5.4.4. Addressing Technical and Ethical Challenges 222

5.5. Comparative Analysis of AI Strategies and Pedagogy Outcomes at CU and UWTSD .. 223

5.5.1. Institutional Differences in AI-Integration Strategies 223

5.5.2. Contributing Factors to Success or Challenges 225

5.5.3. Learned Lessons from CU and UWTSD 226

5.6. Role of AI in Fair Student Evaluation and Institutional Transformation 228

5.6.1. Accuracy and Fairness of Using AI-based Systems for Educational Assessments .. 228

5.6.2. Implications for Educational Needs and Physical Infrastructure 230

5.6.3. Ethical Concerns about Automated Evaluation 232

Chapter Six: Conclusion 234

6.1. Introduction 234

6.2. Summary of Findings 235

6.2.1. Recap of Research Objectives 236

6.2.2. Main Insights from questionnaire survey 238

6.2.3. Main Insights from Qualitative Data 239

6.2.4. Synthesis of Data Findings Across Both Institutions 240

6.3: Case Study Analysis: Coventry University (CU) 241

6.3.1: Overview of CU's educational approach and infrastructure 241

6.3.2: Current applications of AI in CU's pedagogic practices 241

6.3.3: Benefits observed, and challenges faced 242

6.3.4: Feedback from educators and students at CU 242

6.3.5: Case Study Analysis: University of Wales Trinity St David (UWTSD) 243

6.3.6: Overview of UWTSD's educational approach and infrastructure 243

6.3.7: Current applications of AI in UWTSD's pedagogic practices 243

6.3.8: Benefits observed, and challenges faced 244

6.3.9: Feedback from educators and students at UWTSD 244

6.3.10: Imperative Analysis of CU and UWTSD 245

6.3.11: Educational Approach and Infrastructure 245

6.3.12: Integration of AI 245

6.3.13: Observed Benefits and Challenges 246

6.3.14: Feedback from Educators and Students 246

6.3.15: Similarities and differences in AI adoption and application 246

6.4. Implications for Educational Practices 248

6.4.1. Impact of AI on Educational Practices 249

6.4.2. Recommendations for Teaching and Learning Environment 251

6.4.3. Best Practices for AI Integration in Higher Education 252

6.5. Contributions to the Education Field 253

6.5.1. Contributions to Academic Knowledge and Theory 254

6.5.2. Practical Implications for Educators, Policymakers, and Students 255

6.5.2: Recommendations for other higher education institutions 256

6.5.3. Impact on Future Pedagogical Innovations 260

6.6. Limitations of the Study 261

6.6.1. Methodological Limitations 261

6.7: Scope and Generalisability of Findings 262

6.8: Challenges in Data Collection and Analysis 263

6.9. Future Research Recommendations 265

6.9.1. Potential Areas for Further Study 265

6.9.2. Exploration of AI's Long-Term Impact on Education 266

6.9.3. Recommendations for Expanding Research Across More Institutions 268

6.10: Reflection on the Study..... 269

6.10.1: Reflections on the AI's Role in Higher Education 270

6.10.2: Closing Notes on AI's Future in Academic Practices 270

6.10.3: Concluding Remarks on the Significance of Research..... 271

Reference List 272

Appendix A: Students' Questionnaire 327

Appendix B: Interviews Questions: 332

Appendix C: Sample of Interview Transcript 334

Appendix D: Sample of Interview transcript of IT staff..... 343

Appendix E: Sample of Participant information sheet 348

List of Figures

Figure 2.1: Resource-Based Theory **58**

Figure 2.2: AI-CoACT framework 61

Figure 2.3: Conceptual Framework 97

Figure 3.1: Research Onion 106

Figure 3.2: Steps in the process of conducting mixed method research 129

Figure 3.3: Six step approach to thematic analysis 133

Figure 3.4: Data source triangulation representation 140

Figure 4.1: Significance and impact of AI tools 156

Figure 4.2: Plagiarism Detection Tools 157

Figure 4.3: Virtual Learning 158

Figure 4.4: Online course positive contribution 158

Figure 4.5: integration of LSM 159

Figure 4.6: Themes for assessing AI Implementations 176

Figure 4.7: AI Integration in Higher Educational Institutions 177

Figure 4.8: Effect of AI on Teaching and Learning Practices 181

Figure 4.9: Concerns of AI Applications in Higher Educational Settings 184

Figure 4.10: AI Implementation Strategies in Higher Educational Institutions 190

Figure 4.11: Implications of AI on Traditional Learning Culture 193

Figure 4.12: Future Recommendations for Successful Implementation 196

List of Tables

Table 3.1: Details of Stakeholders Group 124

Table 3.2: Details of organisation's participation 125

Table 4.1: Demographic Characteristics of Participants 150

Table 4.2: Knowledge of AI in Higher Education, Challenges, and Benefits 153

Table 4.3: Reliability Analysis 160

Table 4.4: Normality Analysis 161

Table 4.5: Analysis of Significant Differences 163

Table 4.6: Correlation 166

Table 4.7: Relationship between AI Integration and Dependent Variables 169

Table 4.8: Analysing Moderation Effects of Challenges and Benefits 171

Table 4.9: Summary of the findings of the interviews 175

Chapter One: introduction

1.1. Introduction

The research-based DBA aims to explore the extent and appropriateness of AI ("artificial intelligence") for pedagogic drives within higher education, applying a case study of UWTSD ("University of Wales Trinity St David") and a collaborative organisation in UK. The research investigates how AI is integrated into educational practices, concentrating on the insights and experiences of major stakeholders, such as students and educationists, while also acknowledging perspectives from policymakers and institutional representatives.

The study incorporates a detailed qualitative design, involving key stakeholders (such as students and educators) through surveys and interviews. It further extends the analysis to other stakeholders, such as academic institutions, to establish a comprehensive assessment of AI's influence in pedagogy. Therefore, the first chapter offers a short introduction to the research and its context, highlighting the importance of AI in higher education.

1.2. Background and context

Artificial intelligence (AI) is a very good technology ushering in a new age of technological, industrial, and social change (Salloum et al., 2021). It is changing, among other things, education, economic growth, social progress, and how the world's government and business work (UNESCO, 2021). AI is not a new concept; however, the researcher stated that the introduction of deep learning and machine learning between the 1980s and 2010s changes the way AI was developed and used (Nil and Aras, 2022). After 2010, a new concept of AI was introduced and a subcategory of machine learning that consisted of a computing system that can engage humans like processing, such as self-correction, learning, adapting, synthesising and use of available data for compound processing tasks (Popenici and Kerr 2017).

Recently, quite a few research projects have looked at the benefits of these technologies for teaching and learning and found that AI helps education move fairly and reasonably (Bond et al., 2024; El-Bishouty et al., 2019, Bobula 2024). AI has dramatically changed teaching and learning recently (Guilherme, 2022).

Various authors argued that universities are essential to society because they study, develop new ideas, and can turn them into useful information (Hebert et al, 2021). Other authors such as Hu et al, (2025) also asserted that Universities do not want to use new methods, studies, and technology to improve their teaching and students' learning. The researcher stated that this reluctance to change in higher education has institutional, cultural, economic, political, cultural, cultural, and contextual causes (Liu et al., 2020). Another researcher stated that changing practices also means renegotiating the complicated relationship between new technologies and old ways of teaching and learning in education institutions (Kim et al., 2022a).

The growing use of AI will significantly effect on higher education. For example, essays are marked by AI (Foltz et al., 2023), and online tests are monitored by AI that recognises people's faces (Swauger, 2020). Aside from universities, the workplace is also changing. Graduates' careers will depend increasingly on AI-mediated workplaces, where job profiles and work practices may change in big ways (Moscardini et al., 2020).

A working paper from the Organisation for Economic Cooperation and Development (OECD) (Vincent-Lancrin & van der Vlies, 2020) found that there is no question that AI will be used more and more in teaching and learning and that it is essential to "prepare students and learners for the transformation of work and society." It has sped up the use of online technologies in higher education (Bayaga, 2022), as well as the chance for "machine-to-student" interactions made possible by AI (Rof et al., 2022, p. 133). One of them could be business goals. Learning management systems that use AI as a selling point (Marachi & Quill, 2020) and widely used business learning technologies like language learning apps that use AI (Pikhart, 2020) could be examples.

Altas (2023) stated that computerisation has historically shifted from regular manual and cognitive work to non-routine analytical and interactive work. This suggests that technologies like AI could significantly affect labor markets and, in turn, higher education. AI is a big change in how higher education and wider socioeconomic interests interact and is not just about technological progress.

In this time of rapid change, when social changes are just as significant as technological ones, universities must set up strong policies and study plans to deal with AI and think about its ethical implications. How AI is seen and what it is depends on what universities do about it. How AI is talked about in higher education literature affects study, policy, and practice, and discussions about technology can have a significant effect. For example, these conversations could legitimise ideas about improving teaching, learning, assessing, collaboration and innovative personalised learning (Dawan et al, 2025).

AI in education has benefits that can be seen and that last. However, the existing research worldwide focuses on no more than its trends (Holmes et al, 2021), concepts (Huang, 2021), application scenarios (Gocen & Aydemir, 2021), integration (Liu et al., 2021), evaluation (Pabba and Kumar, 2020), Higher education institute (HEI) (Shan et al., 2021a; Wenge, 2021), personalised learning (Liu et al., 2020; Normadhi et al., 2019).

According to Huang (2021), using artificial intelligence in the classroom improves students' capacity for knowledge, teamwork, and learning. Pebba and Kumar (2021) investigated the use of artificial intelligence in education across a number of nations and discovered that this cutting-edge technology has a considerable impact on both the effectiveness of teaching and individual competitiveness. It can also assist teachers in monitoring student progress and providing comments.

In addition, new technology has fostered HEI innovation and reform. New technologies, including AI, are frequently born in HEIs (Shan& Wang, 2021). Instead of traditional schooling, classes utilising artificial intelligence technology can increase students' enthusiasm for studying and produce superior academic performance (Shan et al., 2021a). Lee and Lee (2021) gave real-class

examples of self-learning, evaluation, and interaction while discussing AI-related ideas, machine learning, and natural language processing. Li and Wang (2023) discovered through comparison trials that AI can encourage college/university students to work more and more diligently in offline lessons. With its immense potential to benefit students and educators both now and in the future, artificial intelligence is attracting more academics' attention. It has already established itself as a technical tool that may not be done without Al (Paek & Kim, 2021).

Previous research has established that technologies based on artificial intelligence are bringing numerous new paradigms to education, learning, and student self-efficacy (Loftus & Madden, 2020, Pendy, 2023). Computer proficiency can attune students to the best academic outcomes in these instructional contexts (Paek & Kim, 2021). Kim et al. (2022a) stated that user-based adaptive AI can improve student learning outcomes. Teachers can better comprehend students' academic achievement by using AI-assisted educational systems, which also evaluate data on learner behaviours and habits (Pendy, 2023).

Moreover, the students or learners are central to how education is done today. Lecturers are now more like teachers and agents of learning than they were in the past. One new movement in higher education is using artificial intelligence to help with teaching and learning (Loftus & Madden, 2020). Over the past ten years, there has been more and more interest in integrating AI into higher education. AI is used in many different areas and businesses. Some well-known businesses that use AI include healthcare, retail, manufacturing, finance, hospitality, travel and tourism etc.

Moreover, human behaviour is based on supposed futures because the future does not exist yet. However, we can use what we know now to predict what will happen in the future. Shneiderman claims in 2020 we can learn more about the future if we know more about the present and the history that led up to it. (Paek & Kim, 2021) To fully understand the benefits and problems that AI causes, we need to have a good understanding of what AI is now and what the future might look like when AI is widely used in society. AI might make learning, teaching, and education more creative, but it could also change society in ways that make it harder for educational institutions to do their jobs (Wang & Shan, 2021). Either it will make learning opportunities fairer, or it will

make skill gaps bigger and make jobs more challenging.

When AI is used in education, we learn new things about how learning works and is measured. It could make teaching more effective, reorganise classrooms, make them obsolete, or push students to adapt to technological needs. This would take away people's freedom and chances to act morally (Wu & Wu, 2020). Currently, it is an excellent time to think about what AI might mean for learning and schooling. There is a lot of discussion about this challenging subject. However, it is necessary, engaging and worth the trouble (Li & Wang, 2023).

To respond to the pressure of implementation of AI in higher education's pedagogy. UK universities: The landscape of higher education is undergoing fast change, and as a result, universities in the UK are becoming increasingly pressured to incorporate artificial intelligence (AI) into their learning and teaching models. In order to alleviate this burden, a multi-pronged UK university: The landscape of higher education is undergoing fast changes, and as a result, universities in the UK are becoming increasingly pressured to incorporate artificial intelligence (AI) into their learning and teaching models. To begin with, educational institutions such as colleges/universities need to instill a mindset of lifelong education in its faculty members (Mir et al., 2023). This will ensure that these individuals are equipped with the information and experience necessary to make effective use of AI tools. Peak and Kim (2021) found that this can be accomplished by holding frequent training sessions, workshops, and collaborative forums where educators can share the methods that have proven to be most successful.

Second, giving top priority to ethical considerations is of the utmost importance because AI systems frequently rely on enormous datasets and universities are obligated to protect students' privacy and maintain a high level of data security (Pendy, 2023). In order to eliminate biases in AI algorithms and ensure that educational outcomes are fair and inclusive for all students, ethical norms need to be developed (Kim et al, 2022b). In addition, educational institutions ought to have candid conversations with students in order to comprehend their points of view and concerns concerning AI-driven education. Through the use of this feedback loop, artificial intelligence capabilities will be used in a manner that will legitimately improve students' educational

experiences (Li & Wang, 2023).

In recent years, new technologies have been mainly responsible for the numerous changes that have occurred in both education and educational institutions. Learning and teaching methods have evolved and continue to change as a result of the internet's rapid development. Thus, as well as introducing new teaching strategies and changing the appearance of traditional classrooms, new technologies also modify how teachers and educators engage with students. Information and communication technologies (ICT) are essential to organisations' ability to complete routine tasks effectively. Artificial Intelligence (AI), one of these novel technologies, is becoming increasingly well-liked. Solutions like AI chatbots are making it more commonplace daily (Slepankova, 2021). Thus, this aims to comprehensively analyse and assess the appropriateness, efficacy, and extent of AI implementations in the context of educational endeavors within HEIs.

The following sub sections discuss the competitive advantage of AI in pedagogy approach, artificial intelligence-based scaffolding in STEM education, teachers' Perception of Using Artificial Intelligence, the role of teachers of Ai based education, the rise of artificial intelligence in higher education, challenges of AI in HE, and overcoming the AI pressure in higher education.

1.1.1: Competitive advantages of AI in the pedagogy approach in UK higher education

A wide range of potential benefits to be gained by using artificial intelligence (AI) in the educational strategy of higher education in the United Kingdom; it gives excellent competitive advantages. To begin with, AI makes it easier to engage in personalised learning by enabling lecturers to adapt course material and available resources to the specific requirements of individual students. This improves the overall quality of the educational experience (Kim et al., 2022a). Mir et al. (2023) found that this is especially helpful in diverse classes where students' comprehension levels can vary greatly. Second, data powered by AI can forecast student performance, which enables early interventions for students who are in danger of falling behind their peers academically. Because of this proactive strategy, student retention rates will improve overall, as they will receive support at the appropriate moment.

Additionally, Holmes et al. (2022) found that the use of AI in administrative functions, such as grading and feedback, not only assures consistency but also frees up educators' times, allowing them to focus on more interactive and value-added educational activities. This is because AI not only maintains consistency but also ensures it. The malleability of AI helps to support the ongoing development of educational programs, which helps to ensure that these programs continue to be useful and align with the continually shifting global scene. In addition, students have access to support around the clock via chatbots and virtual assistants powered by AI, which can answer questions and provide direction outside the regular hours that classes are in session (Pendy, 2023).

In addition, because of the United Kingdom's dedication to research and innovation, the country's higher education institutions are always at the forefront of artificial intelligence breakthroughs in education. This places universities in the United Kingdom in a position of global leadership, which attracts students from other countries and helps to cultivate a culture of excellence.

By examining students' learning patterns based on big data, AI can also enhance assessment methods in conventional classrooms by providing timely information on students' learning progress, success, or failure (Hooda et al., 2022). This means that information that would not have been available with earlier evaluation techniques can be demonstrated and presented by AI. AI enables teachers to determine whether a student has arrived at the right answer while also revealing the student's thought process. AI can also correctly identify learners' psychological states (such as boredom, frustration, and sadness) and offer guidance tailored to each circumstance.

According to Lameras (2021), Adopting AI in the UK's higher education setting represents a paradigm-shifting change in the pedagogy approach. The competing benefits of AI are found in its ability to provide personalised educational opportunities, increase student involvement, and simplify administrative procedures. AI personalises educational material to meet the needs of each learner via adaptive learning systems, improving understanding and retention. Real-time assistance from virtual assistants and AI-powered chatbots increases student happiness and

engagement. AI facilitates practical data analysis, boosting administrative effectiveness and assisting with data-driven decision-making. These developments establish UK higher education institutions as forerunners in educational inventiveness, attracting students looking for a highly developed technological atmosphere and personalised learning experience.

1.2.1. Educational Use of Artificial Intelligence

AI can have various positive and negative effects on learning in traditional schooling (Dignum, 2021). Since AI is currently a significant concern for policymakers, it could benefit from being applied in as many areas of education as feasible. Technologies provide the impression that conventional concerns can be addressed in whole new ways when innovative, exciting technologies become available and when the limitations of technology and the challenges of applying it may not always be fully understood. This occurs in the early stages of the life cycles of technologies that have a wide range of applications and cause a push towards technology. People in business and decision-makers can see the potential of emerging technologies and how they can change things with an overarching goal. When people realise that AI will modify existing education and make it more effective (Eguchi et al., 2021), in addition to the setting in which learning occurs and where it becomes socially meaningful, the interest in the learning space will subside (De Cremer & Kasparov, 2021). A number of the disciplines that people study today satisfy the requirements of a changing contemporary society. Automating processes that only perpetuate ingrained behaviours is simple. Sophisticated conceptual frameworks, mainly employed in math, would be complex for an individual student to comprehend with a complicated set of societal objectives and practices. AI may provide innovative techniques to modify educational material to fit each learner's personality and learning preferences (Pendy, 2023; Kadaruddin, 2023).

Developing skills that enable participation in the economic sector of life is one of the primary functions of the modern educational system (Khasanov, 2022). The evolution of industrial society and the history of educational systems are intimately related, and wage employment

continues to be a major organising factor in industrial societies and their daily lives. As a result, education is frequently viewed as a means of obtaining work in high-level policy talks. According to this analysis, education plays a significant role in determining economic competitiveness and productivity, and educational programmes are developed in the larger picture of economic development. Consequently, it is crucial to consider how AI may change work and employment while determining educational programmes (Dondi et al., 2021).

In recent years, different periods of new learning technology have existed; today, there is AI (Seba et al., 2021). As cited in Tewari and Bose (2023), John McCarthy invented the term "artificial intelligence" in 1956. However, this term does not relate to specific technologies. It is instead referred to as computers that accomplish computational tasks typically connected with human brains, especially acquiring knowledge and solving problems (Baker & Smith, 2019). Various analytical techniques are referred to generally as AI. According to Kuwahara et al. (2021), these techniques fall under deep learning, neural networks, and machine learning (ML). The ability of an algorithm to learn from the facts and determine what to do without having been coded is known as machine learning (Popenici & Kerr, 2017). Although many other models are available, supervised and unsupervised learning models are the most common in ML (Alloghani et al., 2020). While unsupervised ML models create models from unlabeled data, supervised ML models utilise data samples (or training data) (Alenesi & Faisal, 2020). In simple terms, the unsupervised model works independently to discover patterns that previously eluded human detection. There exist multiple methods by which AI can be used in educational institutions.

As an illustration, AI has been incorporated into many pedagogical tools, including smart education, autonomous evaluation mechanisms and chatbots (Clark, 2025). These AI-powered solutions present many potential benefits for all parties involved in the processes of instruction and learning (Chen et al., 2020). Past studies on the application of AI in education highlighted many uses, including automatic essay rating (Yuan et al., 2020), tracking the progress of pupils (Swiecki et al., 2023), analysing pupils' backgrounds (Smith, 2023), forecasting the likelihood that pupils will enroll in school or drop out (Popenici & Kerr, 2017), easing the responsibilities of

teachers in shared information development (Suwastini et al, 2021), organising of educational events and adaptable evaluations of instructional methods (Metsäpelto et al., 2022), and cooperation among pupils and adaptation of AI learning (Luckin, 2023). Notwithstanding these possibilities, the implementation of AI in the educational sector lags further behind expectations than in other fields (such as healthcare and finance). Teachers, in particular, ought to be involved in the conception, growth, and incorporation of AI for educational purposes to ensure the effective adoption of AI (Ayanwale et al., 2022; Kim et al., 2022a).

1.2.2. Artificial Intelligence-Based Scaffolding in STEM Education

Even though AI has shown that it may be a valuable instructional application, some problems still need to be addressed regarding the way it makes learning relevant and efficient. Intelligent tutoring systems (ITS), or computer-based learning assistance systems, displayed some possibilities before AI was introduced to education. ITS attempted to give individualised and comprehensive instruction in well-defined areas like mathematics using data from professional expertise theories, student models, and tutoring models (Holmes et al., 2021). Reviewing the literature on ITS helps point researchers in the right direction for how to apply AI in the educational sector since particular academics have seen ITS as the forerunner of AI for educational purposes (Kurni et al., 2023). ITS is used in the teaching of many STEM courses. In Beal's (2013) study, for instance, ITS employed problem-solving difficulties to gauge the ability of pupils in each math area before selecting and presenting challenges to students, who ought to be ready to resolve them through the use of the combined support resources throughout the area of proximal advancement. In order to help fulfil one or more of their learning goals, they offered further tuition using interactive resources (Beal, 2013).

The idea that ITS is trying to offer scaffolding has been brought up in several research studies, including the ones described above. According to Ashta, and Herrmann (2021), scaffolding can assist learners in developing their in-depth subject understanding and ability to think critically and make instructional activities simpler and readily available. The delivery of scaffolding

interventions can take many forms, including feedback, question cues, suggestions, and expert modelling, comparable to what human tutors in STEM education do. Each scaffolding format's impacts can change depending on the learning setting, performance level, STEM disciplines, and desired results (Ashta, and Herrmann, 2021).

Two things should be included in the optimal scaffolding for pupils. First, in-the-moment helps to broaden and enhance learners' cognitive capacities when writing about science and to satisfy students' inquiries into science. Second, providing students with flexible assistance that challenges and organises empirical problem-solving skills allows them to develop more complex abilities (such as argumentation) even when working on poorly organised issues (Aguado-García et al, 2025). Various electronic scaffolds are being created in STEM education settings to meet students' present educational positions and requirements. These scaffolds include strategic, metacognitive, procedural, and conceptual scaffolds. Learners are guided to find solutions through the use of strategic scaffolding. Students can examine their thoughts and learning processes with the help of metacognitive scaffolding. The utilisation of accessible materials is guided by procedural scaffolding for learners. In order to help learners acquire knowledge, conceptual scaffolding gives them resources, ideas, or both (Suwastini et al., 2021). Strategic and metacognitive scaffolding based on computers can be significant in the development of texts, especially for scientific writing, as these scaffolds can direct students as they move through the writing process. These two scaffolding kinds also allow learners to consider the justification they should include in their argument, which may strengthen their ability to reason and express their ideas (Kim et al., 2022b). Through ITS, conceptual scaffolding and strategic and metacognitive scaffolding have also been made possible. Although conceptual scaffolding using ITS is technically possible, it is inferior to the other two forms due to technological restrictions. Additionally, ITS bases most of its scaffolding on fixed-time intervals, which are not the best option for assisting students' ability to learn independently and for reason.

1.2.3. Teachers' Perception of Using Artificial Intelligence

Studies over the past few years have provided important information that the widespread unfavourable perception of technological advances among teachers has been claimed to have prevented the widespread adoption of AI in educational settings (Istenic et al., 2021; Kaban & Ergul, 2020). One explanation is teachers' apprehension about utilising emerging technologies (Balliammanda, 2021; Gabriel et al., 2022), their choice to stick with the resources and teaching methods they are currently comfortable with (Shabibi et al., 2023; Ragan et al., 2023), and their resistance to initiatives to implement technologies in person (Hébert et al., 2021).

According to past studies on teachers' general impressions of artificial intelligence, it has been claimed that educational institutions have been significantly impacted by AI-based technologies that were popularised in science fiction and the media. As a result, they believed that AI-based technologies would threaten their professions instead of being utilised to improve instruction and learning (Luckin, & Cukurova, 2023).

The deployment of AI in many educational contexts is just one example of the considerable advances in the field of education that have raised instructors' requirements. With this, an innovative idea known as Artificial Intelligence in Education (AIED), which encompasses all facets of the academic usage of AI, was recently developed (Tapalova & Shiyenbayeva, 2022). Teachers' opinions of AIED applications differ based on their academic beliefs, their experience as educators, prior use of technological innovations in education, and the need and efficacy of a specific technology, all of which can affect how keen they are to embrace novel technologies for education (Wang et al., 2021).

Teachers frequently anticipated AI should be capable of accomplishing two things, according to various research looking into teachers' perceptions of AIED. First, create a more successful learning and instruction environment using automated learning materials and bidirectional interactions between humans and computers (Jia et al., 2022).

Second, deal with each student's different learning challenges, addressing their requirements despite big groups of students (Holmes et al., 2021). In addition, studies suggest that AIED may considerably lessen instructors' organisational strain through control over routine, easy activities (Qin et al., 2020). Although teaching professionals have high hopes for AIED, studies have shown that prior to the implementation of AI in educational settings, educators must initially become proficient in utilising technological tools and, more crucially, properly integrating into their educational programmes.

To be open to incorporating cutting-edge technology into their classes, teachers must also comprehend the significance of AI and its educational benefits (Alam, 2021; Mir et al., 2023). Furthermore, many instructors and educational administrators still need AI-based instructional assistance. They may only view it as significantly sophisticated educational technology, which could understate the AI's contribution to the learning environment. As a result, for an AI assistance programme to be successfully implemented in school, instructors must initially employ it to ensure they can completely comprehend how it helps scaffold learning.

1.2.4. The Roles of Teachers in AI-based Education

According to Alotaibi, & Alshehri (2023), the shift in educational institutions regarding online learning sometimes means that students will require fewer teachers in the future. Studying the benefits AI offers instructors and how these benefits can affect teachers' roles in educational settings is more rational than speculating whether AI will replace teachers (Alam, 2022). In terms of artificial intelligence, Holstein et al. (2022) hypothesised that in the future, AI-based robots could assist teachers in carrying out what Alotaibi, & Alshehri (2023), emphasised as their orchestrator function in the process of teaching and learning. However, before AI can fully assist instructors, it must figure out how to effectively orchestrate teaching and learning from educators' data. This is so students can learn effectively, which relies on teachers' ability to employ the proper pedagogical techniques in their education (Tondeur et al., 2020).

Additionally, their pedagogically valuable and fruitful teaching incidents can be examples of

educational AI platforms (Chang et al., 2023). That is, the basis for teaching using AI is built on data gathered from the learning environment managed by teachers. For instance, the information might aid researchers in comprehending when and how education is developing effectively (Luckin & Cukurova, 2023). This study looks into the types of data collected from teachers and the roles that teachers play in the development of AI algorithms to demonstrate how important it is for teachers to provide information on the characteristics of effective learning for the development of AI algorithms.

Teachers must be given the necessary information, abilities, and attitudes in order to deploy AI-based teaching in the classroom successfully (Seufert et al., 2021). Due to the untapped potential of AI in education, teachers' AI-related abilities still need to be effectively defined (Luckin & Cukurova, 2023). It is necessary to thoroughly examine how instructors interact with AI-based systems in their educational environment in order to examine their knowledge, skills, and attitudes linked to AI (Seufert et al., 2021). As a result, the author conducts research on teachers' interactions with AI-based systems and their involvement in the creation of AI-based educational systems. It is anticipated that this subject will help identify teaching strategies connected to artificial intelligence and facilitate the successful adoption of AI-based instruction in classrooms with the help of educators.

1.2.5. The rise of artificial intelligence in higher education

For the last three decades, the implementation and utilisation of cutting-edge technologies in teaching and learning have progressed quickly (Marrahí-Gómes & Belda-Medina, 2022; Hooda et al., 2023; Yasdani-Asrami, 2023a). When viewed from a contemporary perspective, it is simple to overlook the arguments that have occurred at educational organisations over whether to allow students to utilise what are now viewed as basic technologies. The use of calculators and spell-checking software for students with disabilities but also the general student body was controversial, as authors point out in a long-term investigation of allowances for students with disabilities that was conducted in the USA between 1993 and 2005 (Mir et al., 2020).

Initially developed to help individuals with disabilities, assistive technologies include text-to-speech, speech-to-text, roaming capabilities, predictive text, spell checks, and search engines. Later, the application of these technological innovations was broadened, and they are now common characteristics in all personal computers, handheld devices, and wearable technology. As a result of the increased opportunities for teaching and educational experience design, these technologies are currently increasing the learning interactions of all students worldwide (Elayyan, 2021; Seo et al., 2021; Devi et al., 2022). Additionally, AI is currently improving the tools and equipment that are used daily in cities and on campuses all over the world, including home appliances, public transportation, and smartphone applications (Brown, 2024; Sallu et al., 2023). Numerous advanced AI techniques have found their way into everyday applications, frequently without being referred to as AI since if anything becomes commonplace and helpful enough, it ceases to be considered AI (Carrillo-Peres et al., 2022).

A wide range of opportunities and difficulties for teaching and learning in higher education now position students at the forefront. Tools are already available to assist people with disabilities in interacting with and collaborating with human-AI systems. They may encourage educators to use them to support students and teachers and make learning a more exciting experience. In the Encyclopaedia of Science, Technology, and Ethics, Carl Mitcham (2005) defines a cyborg as "a crossbreed of a human and a machine". The possibility of fusing human capabilities with new technologies is now being employed and developed at an accelerated rate; therefore, the concept of cyborgs is closer than one might think. Incorporating ML algorithms and complex computing systems can assist people of various abilities and, to a certain extent, engage in complex processing activities that can be used in teaching and learning (Gill et al., 2022; Yathiraju, 2022). For higher education institutions, this heralds the beginning of a new age (Basheer, 2023).

This kind of human-machine interface can drastically alter how humans acquire knowledge, retain it, and produce new information. Universities will soon feel the effects of this surge in interest and funding for artificial intelligence. Most likely, the need for AI solutions will be driven by financial constraints brought on by the enormous number of students pursuing higher education today,

which is motivated by the desire to democratise higher education, as well as the global student market. In terms of the number of academics employed and tenured posts, the academic profession has been "outsourced," leaving it vulnerable to a massive takeover by artificial intelligence (Ashta & Herrmann, 2021).

Cost-cutting measures are required due to the "massification" of higher education and the political pressure to reduce government support for universities. The MOOC boom revealed the alluring option for many university administrators to save expenses by decreasing pricey academic teaching staff despite research still being the primary funding source and status in international rankings (Chan & Hu, 2023). With a steady shift between temporary and contract employment, Australian colleges vigorously pursue this evolution.

According to a study by the L.H. Martin Institute, the quantity and proportion of university faculty members with determined meetings are on the rise, while the proportion of educational workers with extended meetings who are also engaged in research and teaching is declining (Chan and Tsi, 2023). Numerous projects in the UK were discovered to be following a similar pattern, such as the University of Warwick's creation of an additional department to hire only casual teaching employees in order to outsource instruction. In order to serve the University of Warwick and market educational and evaluation activities to other universities, this new department was created to operate similarly to a different subsidiary employed for paying catering and cleaners (Mindell & Reynolds, 2022).

As in the previous examples, it is currently conceivable for the human brain and a computer to "crossbreed," which will force instructors to develop novel features, factors, and completely new pedagogies for a new type of instructional and learning environment. For instance, brain-computer interfaces (BCIs), which have captivated the interest of researchers everywhere, are now experiencing tremendous progress. Experts in the area currently offer practical ways for controlling computer programs with a brain-computer interface by using brain signals with various recording and analysis methods, as well as cutting-edge technology solutions for innovative computer systems (Ma and Su, 2020).

With the development of BCIs, people with motor function limitations can now communicate and control their environment (Karikari & Koshechkin, 2023). Ma and Su (2020) showed that both healthy patients and people with neurodegenerative diseases can quickly and accurately manipulate brain-computer interfaces (BCIs). Technology is currently redefining mankind and human potential at an unprecedented rate. The possibility of applying AI-based solutions to improve the abilities of humans continues to grow with the advent of technology. Innovations in educational institutions involve more than just adding technology to more classroom settings; it also entails modifying instructional strategies so that students may develop the knowledge and abilities necessary to succeed in globally competitive markets (Popenici & Kerr, 2017).

1.2.6. Challenges of AI in higher education

The field of higher education is one of the many fields in which artificial intelligence (AI) has made significant advances in recent years (Pendy, 2023). While artificial intelligence (AI) can potentially transform the educational approach taken in universities and colleges, it also presents several issues that educators and Universities must address.

Results from earlier studies demonstrated that one of AI's most significant challenges is the loss of Personal Touch with the learners and teachers (Ragan et al, 2023). The possibility of a reduction in the human element is one of the critical worries raised by those who are considering the adoption of AI in educational settings. Traditional pedagogy strongly emphasises the relationship between the teacher and the student. In this model, teachers are expected to comprehend the unique requirements of each pupil and offer individualised instruction (Sallu et al., 2023). Putting too much stock in AI could make education more impersonal, cutting down on the experiential and interpersonal learning in classrooms.

Another challenge is a concern Regarding Data Privacy. Intelligent computer systems need access to vast volumes of data in order to function successfully. This is keeping track of the activities, accomplishments, and relationships that students have with one another while in a higher education setting. Concerns over the students' right to privacy, as well as how their information will be

utilised and safeguarded, are raised as a result of the vast data collection (Xia et al., 2023).

Excessive dependence on technology is another challenge to implementing AI in higher education (Shabibi et al., 2023). There is a possibility that both teachers and pupils will grow to rely excessively on the tools provided by AI. Because of this, individuals can rely on AI for solutions rather than thinking independently, which could lead to a lack of critical thinking and problem-solving skills.

Equity and Access is one of the challenges. There is a digital divide since not all students have the same level of access to advanced artificial intelligence tools and resources. Students who come from disadvantaged circumstances can discover that they are at a disadvantage, which will only serve to exacerbate the gap between the various student groups.

Training for Faculty Members is one of the biggest challenges for Ai implementation in Higher education (Xia et al., 2023). To successfully integrate AI into educational practices, faculty members will need to receive training in emerging technologies. This can be time-consuming, and teachers who are accustomed to more conventional ways of instruction may be resistant to changing their practices. The implementation of AI technologies in higher education can come with significant financial implications. It may only be possible for some organisations to invest in hardware, software, and training for their employees.

The future employment market and necessary skill sets might alter significantly from the present due to the job displacement and replacement caused by AI (Yu et al., 2023). Numerous studies have found that routine, organised work is more straightforward for machines to perform and is about to be supplanted by AI. Contrarily, it is more difficult for AI to take over jobs that require managing humans and are less controlled. Continuous adaptation and evolution are required in higher education. The two main areas where AI will impact higher educational institutions are courses and enrolment. In educational institutions, courses of study will be significantly altered by AI. AI's agility, precision, and constancy are its main advantages. Competing with AI in these areas is pointless. However, AI continues to have room for improvement when it comes to soft

skills like empathy, teamwork, communication, leadership, compassion, critical thinking, problem-solving, and social interaction (Bühler et al., 2022).

Moreover, this does not imply that one should disregard the importance of hard skills like mathematics, physics, and technology. Although students should still have a solid foundation in math and science, educational institutions should also allow them to develop their interpersonal abilities. Since business executives and management are required to be familiar with the capacity, restrictions, and consequences of AI in the corporate sector, some colleges have begun providing ML and AI programmes to both business management and computer science students. Enrollment is another effect of AI on educational institutions. The popularity of majors in the humanities and liberal arts may increase since these fields are less vulnerable to "AI-invasion." A sharp decline in enrollment may occur in disciplines like financial analysis and accounting, which may severely impact AI (Pedro et al., 2019). Additionally, due to the economic divide and the possible loss of millions or even billions of jobs, many people might need more money to afford higher education (Xia et al., 2023).

The growing diversity of students enrolled in higher education, rising class numbers, rising personnel costs, and other college budgetary challenges enable technological devices or teacher boots to be a fascinating alternative. Massive open online courses (MOOCs), which awakened the creativity of numerous higher education leaders, made this clear. "Open courses" are understood to have no prerequisites or fees, allowing online learners from any place worldwide with internet accessibility to sign up and enroll. These two elements made it possible for institutions to advertise to students worldwide, leading to a considerable enrollment increase (Kuleto et al., 2021).

The promise was generous, but it soon became apparent that one of the challenges teachers faced was their ability to actively engage with large groups of diverse students who were studying across the globe in various time sones, at varying rates of progress, and with multiple points for interpretation and fundamental abilities for the course that they are taking (Krause et al, 2024). Conducting tests, giving helpful, individualised comments, and helping huge classes of students advance through their study efficiently all still need to be solved (Popenici & Kerr, 2017).

According to Bayaga (2022), productivity-oriented solutionism, rather than academic or altruistic thinking, is what is driving the present stance on the use of automated approaches in education. The "cold technocratic imperative" must be replaced by reexamining a humanistic approach in mass education.

As AI becomes more prevalent, it becomes difficult to avoid an essential conversation about how educational activities will be conducted in the future in educational institutions, as well as what decisions institutions will undertake in this respect. It follows that teaching in colleges and universities necessitates a reevaluation of instructors' roles and pedagogies due to the rapid rate of technological innovation and related job displacement, frequently recognised by industry professionals (Basheer, 2023). Who determines the direction of teaching and learning corporate initiatives or institutions of higher education? This topic has already been raised using technical solutions like "learning management systems" or IT solutions to identify cheating. The rise of technologies and the quasi-monopoly of a few tech giants also come with questions regarding the importance of privacy and the possibility of a dystopian future. These issues deserve special attention as universities should include this set of risks when thinking about a sustainable future (Popenici & Kerr, 2017).

Moreover, many sets of tasks that are currently placed at the core of teaching practice in higher education will be replaced by AI software based on complex algorithms designed by programmers that can transmit their own biases or agendas into operating systems. An ongoing critique and inquiry in proposed solutions stay critical to guarantee that universities remain institutions able to maintain civilisation, promote, and develop knowledge and wisdom (Popenici & Kerr, 2017).

1.1.8. Overcoming the AI pressure in higher education

As AI becomes more prevalent, educational institutions must engage in critical discussions about how teaching and learning will evolve. The rapid advancement of technology necessitates a reevaluation of instructors' roles and pedagogies, particularly in light of potential job displacement. This transformation challenges universities to maintain their core mission of promoting knowledge

and wisdom while adapting to new tools and methods (Eze et al, 2020). The rise of tech giants and their influence on education raises concerns about privacy and the potential for a dystopian future. These issues should be integral to discussions about sustainable education. Moreover, AI-driven algorithms, designed by programmers who may inadvertently embed biases, are poised to replace many traditional teaching tasks. Therefore, continuous critique and thoughtful integration of AI are essential to ensure that educational institutions uphold their societal responsibilities. UK higher education must prioritise a human-centric approach, balancing AI-driven tools with personalised, interactive teaching strategies. To achieve this, faculty members should receive comprehensive training in AI integration, and ongoing professional development should be emphasised. Encouraging open dialogue and collaboration between educators, students, and AI systems can help alleviate concerns and enhance educational experience. By focusing on the complementary roles of AI and human instructors, UK universities can embrace technological advancements without compromising the essential human elements of education (Popenici & Kerr, 2017).

1.2: Research Gap

Although the body of research on AI implementation in educational institutions provides insightful reading. First, even though much research has examined the more general use of AI in the educational process, there are only a few comprehensive studies that particularly examine its appropriateness and extent within the UK's educational system. Given the particular qualities and institutional settings of educational institutions in the area, this difference is notable and calls for a focused analysis (Alotaibi, & Alshehri, 2023; Basheer, 2023). Furthermore, earlier studies frequently offered a macro perspective, highlighting underlying patterns and possible advantages of AI implementation. However, only a few extensive studies examine the real-world effects and difficulties of applying AI in particular higher educational organisations. By performing an in-depth study of two institutions, the present study aims to close this knowledge gap and provide an in-depth comprehension of the localised dynamics and observations around the implementation of AI. The opinions of other stakeholders, like administrators, pupils, and educators, have yet to be adequately reflected in the available research. It is essential to comprehend their unique points of

view to assess the efficacy and usefulness of AI programmes for various academic tasks and purposes. Given the technology's quick advancement, a current assessment of AI's inclusion in educational institutions is also necessary. By offering a current study of AI implementation in educational institutions that takes into account recent advances and developments in the application of AI technologies for pedagogical plans, this study attempts to fill this temporal gap.

Based on the research on AI in education the researcher have discussed so far, there are no studies on how in HEI affects student learning performance (research gap 1), there is not much research on Artificial Intelligence capabilities (AIC) in HEI under resource-based theory (research gap 2) (Vasudevan, 2021; Wang and Cheng, 2021), and there are no studies on how AIC in HEI affects student creativity, self-efficacy, and learning performance and how artificial intelligence integrated into their pedagogic practices in higher education in UK (research gap 3). Unlike previous studies, this one will focus on breaking down the parts of AIC at the HEI level and how they affect students' creativity and academic performance. It will also look for practical research references, countermeasures, and solutions that can help HEIs adopt cutting-edge technologies to help with education.

Below, the researcher asks simple questions that illustrate the relevance of AI for higher education and practice.

Should AI be implemented into curricula for higher education? How will AI impact on enhancing teachers' and students' digital literary, creativity and academic performance? What extent has this integration impacted the overall educational experience for students? Does AI mean that HEI need fewer classrooms? What is the appropriateness of AI in pedagogy practices in Higher education?

These research questions integrate with the research objectives in analysing AI's effect on academic performance, creativity, and student engagement, but different in scope. The current research measures the effectiveness of AI in the existing pedagogical framework at UWTSD and CU. In contrast, such questions represent a broad argument on infrastructure changes, curriculum association, and AI's appropriateness. These straightforward inquiries are important for

comprehending the future of education, teaching, and learning. Of course, there are more complicated solutions.

1.3. Research aims and objectives

This study aims to comprehensively analyse and assess the appropriateness and extent of AI implementations in the context of educational endeavors within UK HEIs. The specific focus will be on Coventry University (CU) and the University of Wales Trinity St David (UWTSD) as a case point which are located in UK. This study aims to get a deeper understanding of the existing challenges and opportunities related to pedagogical interventions argument by artificial intelligence (AI). Additionally, this research seeks to offer the results to all concerned stakeholders of AI in educational practices, with a focus on teaching and learning processes to the universities studied. This research is also intended to contribute to knowledge about the relevance and appropriateness of AI to the education sector and to wider societal developments

1.2.1: The objectives of this study are as follows:

1) To evaluate the current state and integration of artificial intelligence tools and methodologies within the pedagogy practices at Coventry University (CU) and the University of Wales Trinity St David (UWTSD).

2) To analyse the appropriateness and perceived effectiveness of AI-driven pedagogic tools and interventions in enhancing student engagement, learning outcomes, creativity and overall academic performance at both CU and UWTSD, comparing and contrasting the results to identify best practices and areas of improvement.

3) To investigate and compare the perceived benefits and challenges associated with the use of AI for pedagogic purposes among educators and students at CUL and UWTSD

4) To examine the AI implementation strategies employed by CUL and the UWTSD in their pedagogic practices.

5) To gather insights from educators, students, and IT staff regarding their perceptions, experiences, and challenges with AI in pedagogy, and based on these insights, provide recommendations for optimizing the use of AI for educational purposes in higher education institutions in UK.

1.4. Research Questions

This study addresses the following research questions:

1) How have Coventry University (CU) and the University of Wales Trinity St David (UWTSD) integrated artificial intelligence into their pedagogic practices, and to what extent has this integration impacted the overall educational experience for students?

2) How do AI-powered teaching tools and activities affect student interest, learning outcomes, and general academic performance at CU and UWTSD? What are the differences in how well these institutions do, showing both the best practices and areas that need more work?

3) What are the perceived benefits and challenges of using AI for pedagogic purposes among educators and students at CU and UWTSD, and how do these perceptions align with actual educational outcomes?

4) How do the strategies and outcomes of AI implementation for pedagogic purposes differ between Coventry University and the University of Wales Trinity St David, and what factors contribute to these differences?

1.5. Problem statement

Artificial Intelligence (AI) has emerged as a transformative force in global education systems, yet its integration into higher education in UK remains a complex and contested phenomenon. The use of AI in educational contexts dates back to early attempts at intelligent tutoring systems in the

1980s, but its mainstream implementation has gained momentum in the last decade, particularly with the advent of advanced machine learning, natural language processing, and generative AI models (Luckin, 2023). Today, AI in higher education institutions (HEIs) in UK manifests through adaptive learning platforms, automated grading systems, chatbots, and predictive analytics tools aimed at enhancing student support and institutional efficiency.

Despite these advancements, the adoption of AI in education presents several challenges. One of the core issues is the tension between AI's promise to personalise learning and its potential to depersonalise the student experience (Williamson & Eynon, 2023). Critics argue that over-reliance on AI risks reducing complex educational processes to algorithmic outputs, thereby undermining critical thinking and student autonomy. Ethical concerns also surface around data privacy, algorithmic bias, and the transparency of AI decision-making (Selwyn & Jandrić, 2024). Moreover, questions remain about the financial sustainability of large-scale AI implementation, particularly in resource-constrained institutions where the return on investment is unclear.

In the context of UK's HE sectors, institutions such as the University of Wales Trinity Saint David (UWTSD) and Coventry University (CU) have taken proactive steps to embed AI tools into teaching and learning environments. While these institutions demonstrate a willingness to innovate, there is a lack of comprehensive, empirically grounded research evaluating the real-world impact of AI adoption on academic outcomes such as student engagement, creativity, and performance. Much of the discourse remains speculative, with insufficient attention paid to whether AI actually enhances the quality of education or merely introduces another layer of digital complexity.

This study responds to the urgent need for a better understanding of AI's role in UK higher education. By examining the historical trajectory, core challenges, and emerging opportunities associated with AI integration, the research aims to investigate whether AI technologies are genuinely contributing to pedagogical improvement or if they risk becoming costly technological distractions. The findings will support institutional leaders, educators, and policymakers in making

informed decisions regarding AI adoption, ensuring that AI serves as an enabler of high-quality, inclusive education rather than a superficial trend.

1.6. Rationale of the Study

The integration of Artificial Intelligence (AI) into higher education has accelerated, offering transformative potential in teaching and learning. Despite this momentum, there remains a significant gap in understanding how AI tools are currently implemented within pedagogical practices at specific institutions, such as Coventry University (CU) and the University of Wales Trinity Saint David (UWTSD). This study aims to evaluate the current state of AI integration in these universities, providing a comparative analysis that sheds light on institutional strategies and practical implementations of AI in learning environments.

Existing research has highlighted the benefits of AI in enhancing student engagement, creativity, and academic performance. For instance, AI-driven adaptive learning platforms have been shown to personalise learning experiences, thereby improving student outcomes (USAHS, 2024). However, limited empirical research investigates the direct impact of AI tools on these specific educational outcomes within the UK higher education context. This study addresses this gap by analysing the effectiveness of AI-driven pedagogic tools and interventions in enhancing student engagement, learning outcomes, creativity, and overall academic performance at both CU and UWTSD.

Furthermore, the perceptions of educators and students regarding the use of AI in pedagogy are crucial for successful implementation. Studies have indicated that while students recognise the potential of AI for personalized learning support, accuracy, privacy, and ethical issues persist (Chan & Hu, 2023). By investigating and comparing the perceived benefits and challenges associated with AI use among educators and students at CU and UWTSD, this research seeks to provide a nuanced understanding of stakeholder experiences.

The study also examines the AI implementation strategies employed by CU and UWTSD in their pedagogic practices. Understanding these strategies is essential for identifying best practices and areas for improvement. As universities navigate the complexities of integrating AI into their curricula, insights into effective implementation approaches can inform policy development and institutional planning (Panopto, 2024).

Finally, by gathering insights from educators, students, and IT staff regarding their perceptions, experiences, and challenges with AI in pedagogy, the study aims to provide recommendations for optimising the use of AI for educational purposes in higher education institutions in UK. These recommendations will be grounded in empirical data and tailored to the specific contexts of CU and UWTSD, thereby contributing to the broader discourse on AI in higher education.

1.7. Significance and Contributions

An essential contribution to the growing discussion about teaching and learning technologies is examining the appropriateness and extent of AI for pedagogical plans in the UK higher educational system, focusing on two particular universities. As AI develops, this emerging study contributes to transforming higher education. Therefore, it is very significant to study on the artificial intelligence to enhance teachers' and students' digital literacy, creativity, and academic performance in higher education, UK.

This study fills in significant gaps and provides knowledge that can be used in higher educational institutions.

(i) Contextualising the Implementation of AI: The localised method of this work is one of its main contributions. While other studies looked at AI educational institutions from an all-encompassing standpoint, this study focuses exclusively on the setting of universities in the UK. This context-dependent research acknowledges the distinctive administrative traits, legal structures, and social variables that influence the use of AI in such particular situations. This study gives important insights which can be immediately transferable to the academic settings of

Coventry University (CU) and the University of Wales Trinity St David (UWTSD) by offering a contextualised perspective. This study fills a significant gap in existing research by doing so. Previous research, which frequently concentrated on regional or societal patterns, may have overlooked the complex nuances of the education system in UK. This localised viewpoint illustrates subsequent studies in different geographical or organisational settings and gives an improved understanding of the difficulties and potential of incorporating AI.

(ii) Analyses of comprehensive case studies: This study uses a thorough case study method, allowing the investigation to have greater scope and specificity. This study thoroughly examines the real-world consequences and challenges of implementing artificial intelligence by concentrating on two different institutions. With this method, it is possible to gain greater insight into the nature of the regional dynamics, difficulties, and possibilities associated with implementing AI in higher educational institutions. This case study offers a guide for future investigations looking into the use of AI in particular institutional settings. This comprehensive case study examination has significant benefits for many factors. It gives an in-depth analysis of how AI was implemented at CU and UWTSD and allows for a comparable viewpoint. The comparison of these two institutions enables the exploration of distinctive strategies, the highest standards, and possible development opportunities. As a result, the current study helps advance knowledge of the various approaches that institutions may take to implementing AI into their instructional practices.

(iii) Perspectives and involvement of stakeholders: This study's focus on perspectives from stakeholders is a noteworthy contribution. Diverse perspectives are taken into consideration when administrators, pupils, and educators are involved in the study process. The efficacy and applicability of AI technologies for various educational responsibilities and functions are thoroughly evaluated due to this all-inclusive methodology.

For administrators, educators, and politicians looking to use AI to improve pedagogical effects, the revelations from these stakeholders have real-world ramifications. By focusing intensely on stakeholders' involvement, the body of work currently available fills a crucial gap. While past research has highlighted the value of taking into account the opinions of individuals who will be directly influenced by AI incorporation, many have implemented this idea into reality. This study goes beyond simple surveys by using qualitative approaches to record important stakeholders' complex views, issues, and suggestions. This offers a more accurate and comprehensive illustration of the effects of AI implementation in higher educational institutions.

(iv) Evaluation of contemporary AI implementation: A current evaluation of the use of AI in educational institutions is essential, given the speed at which technology is developing. This study provides the education community with up-to-date knowledge to support decision-making and long-term strategy by collecting the most recent advances and developments in artificial intelligence. This emphasis on modern analysis provides a crucial reference point for comprehending the evolving characteristics of the application of AI. It recognises that the education environment is dynamic and constantly changing as a result of technological advancement. This study enables institutions to make well-informed decisions using the most recent data available by offering a current perspective.

(v) Legislation and Practice Information: This study's findings have an immediate impact on educational legislation and practices. The study provides practical suggestions for organisations, governments, and education-related technology creators by highlighting the advantages, difficulties, and stakeholder viewpoints around integrating AI (Chang et al., 2023). These perceptions can direct the creation of strong regulations, specific training programmes, and calculated investment in technological resources, which will enhance the caliber and availability of educational opportunities. The study stands out due to its pragmatic approach to legislation and practice. This study extends it further by providing useful, context-specific advice, whereas numerous investigations might conclude with general recommendations.

Ultimately, this study significantly advances teaching and learning technologies and educational institutions by providing a localised, comprehensive, and stakeholder-inclusive evaluation of AI incorporation. This study offers important contributions that guide legislation and practice in the evolving educational system through the contextualised approach, thorough case study analysis, and stakeholder interaction.

1.8. Scope and Limitations

By using the chosen two academic institutions i.e. UWTSD and Coventry, the utilisation / application of AI driven technology for pedagogical improvement purposes within the UK's is thoroughly explored in this study. The study covers a range of topics, including the adoption rate of AI, how beneficial and difficult it is to use, and the differing stakeholder perspectives. This study explores the potential for AI to enhance teaching approaches, student participation, and learning effects, in addition to evaluating the existing status of AI integration. The effects on institutional tactics, administrative procedures, and the development of curricula are also considered in the context of why UK universities should incorporate artificial intelligence into their pedagogy approach

The United Kingdom, which is well-known for having established educational institutions, traditionally been at the vanguard of academic advancement. The researcher's reading and experience led me to believe that in the modern era, when technology is transforming every aspect of our lives, it is essential for Higher education institutions in the UK to incorporate Artificial Intelligence (AI) into their method of instruction. As artificial intelligence (AI) becomes increasingly ubiquitous in a variety of fields, students who are armed with knowledge and abilities related to AI will be better prepared for the job market of the future. It is the responsibility of educational institutions to ensure that the graduates they produce are not merely consumers but also creators of the transformational technologies (Yu and Xu, 2023).

The researchers' reading and experience led me to believe that personalised Learning: Artificial intelligence has the ability to adapt instructional material to the specific requirements of individual

students, resulting in a learning experience that is both more personalized and more productive. This form of adaptive learning can accommodate to the academic strengths and limitations of individual pupils, allowing them to reach their full academic potential.

Efficiency and Automation: Artificial intelligence has the potential to automate administrative activities, freeing up time for teachers to spend more time actually teaching rather than dealing with paperwork. This contributes to a more effective educational system and improves the quality of the educational experience as a whole.

Furthermore, the researchers' reading and experience led me to believe that AI is able to handle enormous volumes of data in a short amount of time, it is assisting researchers in gaining insights and discovering discoveries at a rate that is faster than ever before. Global Competitiveness': In order to keep the United Kingdom's universities in the forefront of education around the world, it is imperative that they remain current with emerging technologies. The use of AI ensures that they will continue to be competitive and continue to attract the best and brightest brains from all over the world.

This study also has certain limitations. The first limitation of this study is that it only includes institutions in UK, which may limit how broadly it can be applied to other educational settings. The extent and variety of collecting and analysing data may be impacted by the study's time constraints, which are set in advance. Additionally, the accessibility of resources, such as artificial intelligence (AI) tools, and the participants' desire to participate in the course of the study may have an impact on the study's scope.

1.9. Outline of the Dissertation

This dissertation is divided into many chapters, each adding to the comprehension of the topic.

Chapter one: this chapter provided background information for the role of artificial intelligence (AI) in pedagogic purposes. Aim, objectives and research questions are designed. The research gaps and problems were identified as well as the significance of the research which was analysed.

Chapter 2: A theoretical basis for this study is provided in Chapter 2, with a thorough overview of the body of research on AI in education. The conceptual framework and Hypotheses were developed based on literature.

Chapter 3: the research methodology is outlined in Chapter 3 in-depth, including the approach, data-collecting strategies, and analysis techniques used.

Chapter 4: The empirical data is presented in Chapter 4. The quantitative and qualitative data were presented. The data analysis was done using SPSSS for the survey and on the other hand, Nvivo was used for the interview data.

Chapter 5: this chapter summaries the main conclusions, consequences, and suggestions for further study and application.

1.10. Chapter Summary

This study provides insight into the revolutionary possibilities of incorporating AI in higher educational institutions. AI adoption has brought personalised learning, greater participation, and reduced administrative procedures. However, the importance of ethical considerations and the demand for continual learning for educators cannot be overstated. It is essential to achieve a harmonic balance between the use of technology and moral principles. A proactive strategy, supported by thorough regulations and regular training, will enable institutions to fully harness AI's potential for a better educational experience as a result of the continual advancement of AI.

Chapter Two: Literature Review

2.1.Introduction

This chapter explores vast research on incorporating Artificial Intelligence (AI) in Higher Education (HE). It looks at significant research and scholarly works that provide insight into the scope and suitability of AI use in HE. This review attempts to identify trends, challenges, and best practices in the context of UK HE by synthesising available literature. It also provides a crucial foundation for understanding the ever-evolving field of educational technology, particularly with reference to AI. Brief overview of the topic

The study focuses on the application of AI in HE, explicitly analysing the extent and suitability of this integration in the context of UWTSD and CUL. AI, demonstrated by cognitive computing and Machine Learning (ML) algorithms, has become a disruptive educational force. This technology, which provides individualised learning experiences, data-driven insights, and administrative efficiencies, has the potential to create an impact to transform pedagogical practices. Moreover, "intelligent computing", a new computing paradigm which has evolved over the recent years with new theories in computing structures and methods, systems, and the applications also being developed. It is changing conventional computing and driving digital transformation in the era of big data, AI and IoT (Zhu et al., 2023). The educational process becomes more effective due to the enhanced correlation of the platforms and applications to the established and required knowledge among learners. Hence AI and ML can be of immense help to e-learning and HEI to a greater extent (Kuleto *et al*., 2021; Slimi, 2021). AI is relevant in higher education since it can accommodate different learning methods and the needs of each individual student (Zawacki-Richter et al., 2019). AI-powered adaptive learning platforms can dynamically modify the way knowledge is delivered to ensure the best possible understanding and retention by using real-time data to adjust the content and teaching methods based on individual learner needs and progress. Furthermore, real-time help is provided via AI-driven tools like chatbots and virtual assistants, which raise student happiness and engagement levels (Almusaed *et al*., 2023). However,

there are difficulties in incorporating AI into teaching. Essential factors to take into account are data privacy issues, ethical issues, and the requirement for thorough faculty training. In addition, it is imperative to tackle the possible disparity in accessibility to AI-driven materials to guarantee fair educational opportunities.

Two academic institutions, i.e. Coventry University and the University of Wales Trinity are the subjects of this study's thorough examination of AI integration. In order to provide important insights into the complex dynamics of AI application in HE and to further our understanding of the changing intersection of technology and pedagogy., Importance of investigating AI's role in pedagogy

It has been found from various research that, in the past two decades, AI technology has been used in education (Graesser et al., 2022; Clark, 2025; Gonzalez, 2025). The Intelligent Tutoring Systems (ITS) create opportunities to develop and test psychological theories and their practical applications in education and cover all the leading AI topics, including data analysis, ML, natural language processing, planning, reasoning, and explanation. As a result, the ITS has created an inspiring environment for formalising psychological feature theories and experimenting with their operationalisation. Since educational systems have developed, AI has been used in a variety of fields, including physics, computing, composing essays, and reading (Chen et al, 2025; Mcdonald et al, 2024). The most common uses of AI in academia are in data visualisation, intelligent teaching, language processing, and autonomous agents (Neha, 2020).

The reading and experience led the researcher to believe that over the last few years, the use of AI in education has produced engaging interactive learning environments and robust learning environments for college students. AI and computer science have brought rapid technological advancements impacting all industries, including education (Nguyen et al, 2023). According to a recent analysis from IBM, Burning Glass, and the Business Education Forum, there will be 2,720,000 more job possibilities in 2020 for people with knowledge and analytics abilities, an increase of 364,000 (Aggarwal, & Girdhar, 2022). It indicates a rising disparity between the supply and demand for people with AI skills. According to Mir et al. (2023), there are 300,000

engineers producing each year in India who are specialised in AI technologies. As a result, people in this industry are earning even greater incomes.The researchers' research and experience led to believe that, since the early 20th century, both teaching methods and the relationship between students and educators have changed significantly due to advancements in educational theories and technologies. Globally, instructional techniques have become more organised to deliver more effective, higher-quality results. The ongoing involvement of technology will be primarily responsible for this change. Due to ongoing technological advancements, one can see a paradigm shift in the way that teaching and learning are done. Educators and students have a dynamic relationship in which educators become more approachable and adept at comprehending the perspectives of their students. Because students and educators are working together to get better results, technology has made learning more collaborative (Neha, 2020).

Given the increasing focus on the interpersonal and emotive capabilities of pedagogical agents, research into AI's function in pedagogy has become crucial for comprehending how the educational landscape is changing (Almusaed et al, 2023). Advances in recent times have broadened the field of study from expert supervision to the interpersonal and relational aspects of agent-learner interactions. Tewari, and Bose (2023), highlight this change and emphasise the significance of examining how visual engagement motivates learning processes. The subject discusses how pedagogical agent research has advanced and how AI is helping education, but it fails to discuss any possible drawbacks or disagreements. Education has been greatly impacted by AI technology, especially in ITS, where a variety of AI subjects are covered, including data visualisation, self-learning agents, language processing, and ML. The information highlights the benefits, which include boosting career prospects for those with AI abilities and developing dynamic, compelling educational settings. However, to guarantee a thorough comprehension, it is imperative to take into account any possible obstacles or disadvantages related to the incorporation of AI into education. Data privacy issues, the requirement for moral AI applications, and the possibility of bias perpetuation in AI systems are a few examples of these. Furthermore, examining many viewpoints on how AI impacts teaching strategies and the relationship between students and educators would offer a more complex and impartial perspective (Chen et al, 2025).

2.2.AI in education and higher education and consequences

There is a need to improve academic understanding of AIEd as the area is expanding and changing quickly. Studies such as Yu and Xu (2023) and Vavekand (2024) have highlighted the necessity of deepening our understanding of the effectiveness of AIEd in learning environments. Researchers are looking into studies on the application of AI in education due to the increased interest in AIEd. A few academics have conducted systematic reviews on a particular subject domain. For instance, Liang et al. (2023) conducted a bibliographic analysis and systematic review of the functions and areas of study for AI in language instruction. The longitudinal bibliometric analysis conducted by Aguado Garcia et al. (2025) concentrated on thirty years of AI use in engineering. Winkler-Schwartz et al. (2021) focused on the application of AI in medical education, seeking out best practices in using ML to assess surgical expertise. Hwang and Tu (2021) conducted a bibliometric mapping analysis on the roles and trends in using AI in mathematics education. These works give particular attention to the application of AIEd in higher education, although they need to offer a comprehensive knowledge of AI in higher education. Research has been done to investigate higher education.

The impact of AIEd in higher education was the subject of a bibliometric study by Hinojo-Lucena et al. (2019). From 2007 to 2017, they examined the scientific output of AIEd higher education papers that were indexed in the Web of Science and Scopus databases. According to this survey, proceedings papers made up most of the document types that were published. The country with the most publications was the United States, and the most often cited papers discussed using of virtual tutoring to enhance learning. According to Chu et al.'s (2022) analysis of the top 50 AI-related higher education articles cited between 1996 and 2020, discussions of forecasts of students' learning status were most common. The majority of the time, AI was used in engineering courses, and it was mostly used for prediction and profiling. Lastly, four main applications of AIEd were identified by Zawacki-Richter et al. (2019) after analysing AIEd in higher education from 2007 to 2018: (1) prediction and profiling, (2) evaluation and assessment, (3) personalisation and adaptive systems, and (4) intelligent teaching systems. The last two years of AIEd in HE does not seem to

have been the subject of any studies, and these authors highlight how quickly AI is developing as well as how AIEd is used in higher education, and they urge more research in this field (Crompton & Burke, 2023).

2.3.Artificial Intelligence Applications in Teaching and Learning

According to Neha (2020), AI has several uses in the field of education.

1. AI can automate fundamental educational tasks, like grading. Although AI may never be prepared to completely replace human grading, it is getting close. Academics presently can change how nearly all multiple-choice exams are graded, and automatic student writing assessment systems may not be far behind.

2. AI tutors may provide extra assistance to students. Although these programmes will teach students the fundamentals, they are not yet suitable for helping students develop higher-order and creative thinking, which is something that real-world lecturers are still needed to support. However, AI instructors will still be able to attempt these tasks in the future.

3. AI-powered tools can provide educators and students with insightful feedback. AI can help educators and students create courses specifically reshaped to their needs, but it can also provide feedback on how well the course is working as a whole. These AI tools allow both students and professors to find areas where they might enhance their instruction.

4. It might alter the function of educators. There will always be a need for educators in the field of education. However, due to advancements in intelligent computing systems and related technologies, the nature of their work may alter. As we've already covered, AI can help students learn more effectively, take over jobs like grading, and eventually replace in-person teaching.

5. AI-powered data can transform how schools locate, instruct, and assist kids. Colleges' interactions with both present and potential students are already changing as a result of clever

data collection enabled by sophisticated computer systems. From admissions to assisting students in selecting the best courses, intelligent computer systems are contributing to a faculty experience that is increasingly customised to the requirements and objectives of each individual student (Neha, 2020).

With a more comprehensive perspective on AIEd in HE, Ouyang et al. (2022) looked into the literature on the application of AI from 2011 to 2020. They conducted a systematic review of AIEd in online HE. The results demonstrate the four primary purposes of AI applications in online HE: prediction of performance, referral of resources, automated evaluation, and enhancement of learning experiences. Salas-Pilco and Yang's (2022) research centred on using AI in HE in Latin America. The findings showed that the following are the most common uses of AI in Latin American HE: image analytics, automatic content analysis, assistive technology, intelligent analytics, and predictive modelling. These studies offer a partial analysis of AIEd in HE, but they do offer insightful data for the online and Latin American settings (Crompton & Burke, 2023).

According to Selwyn, & Jandrić, (2024), investigating AI programmes for instructional purposes emphasises the technology's revolutionary potential in a range of educational domains. However, a balanced argument is required to provide a nuanced position. It has been proven that AI can automate basic educational operations like grading. Even while AI continues to automate some grading jobs, such as multiple-choice questions and simple assignments, it is important to weigh this development against its limitations when evaluating more intricate, creative tasks that call for human opinion. While it is acknowledged that further help can be provided by AI instructors, it is also acknowledged that the support required of higher-level and innovative ideas may only partially be replaced by present AI programmes. The discussion increases complexity by including an alternative viewpoint regarding the possibility for future breakthroughs and the developing skills of AI tutors. Highlighted are perceptive comments from AI-powered tools that underscore the advantages of customising courses to meet the specific requirements of each student. However, one ought to think about the downsides as well, such as the ethical concerns of using AI too much in instructional design and the significance of retaining

the human component in the process of learning. The study discusses how the development of AI may change the roles that educators play, acknowledging that AI can both augment and replace human labour in learning. However, in order to give an accurate evaluation, it can be essential to discuss the fundamental qualities of human instruction, such as compassion, mentoring, and the capacity to stimulate critical thought (Neha, 2020). Personalised learning experiences are highlighted, along with the revolutionary effects of AI-driven data in education. Concerns about data privacy, the ethical processing of educational information, and possible errors in AI algorithms that could affect decision-making must all be addressed in order to preserve equilibrium. Studies by Ouyang et al. (2022) and Salas-Pilco and Yang (2022) are included to illustrate various viewpoints on AI applications in Latin America and online higher education, which deepens the discussion. However, it is essential to take into account any possible drawbacks or concerns to this research in order to have a more impartial perspective (Crompton & Burke, 2023).

2.4.Theoretical Foundations of AI in Pedagogy

A number of theoretical frameworks that support the incorporation of AI in pedagogy provide an underlying foundation for comprehending and executing AI-driven educational practices. This section delves into the Resource-Based Theory and its use in directing the efficient use of AI resources in learning environments.

2.4.1. Resource-Based Theory

According to the Resource-Based Theory, an organisation's capacity to strategically deploy and use its unique resources gives it an edge over competitors. This theory stresses the significance of acknowledging AI as a helpful tool that can improve teaching methods in the realm of education (Assensoh-Kodua, 2019). AI technologies can potentially transform instruction and learning methods in educational settings. These options include virtual assistants, data analytics tools, ITS, and adaptive learning platforms. Through the strategic integration and efficient utilisation of AI-powered resources, educational institutions may enhance their competitiveness in providing top-

notch instruction. According to this theory, institutions must have the skills and knowledge necessary to use AI efficiently (McDonald et al, 2024). This requires developing a culture of creativity, ongoing learning, and adaptation among educators and stakeholders in addition to obtaining the needed technology infrastructure. It also emphasises the changing nature of AI resources (Bura, and Myakala, 2024).

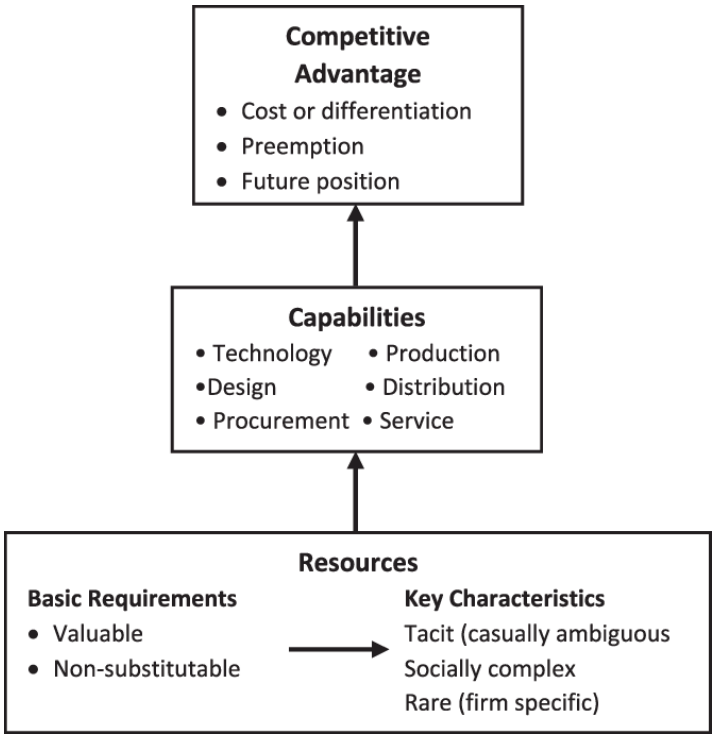


Figure 2.1: Resource-Based Theory (Hart, 1995)

According to researcher's view after conducting research, the educational institutions need to be flexible in integrating and using these resources as technology develops and new AI uses appear. In order to do this, one must take the initiative to keep up with technological advancements and assess how they may influence teaching methods. The Resource-Based Theory provides a valuable theoretical foundation for understanding how AI can be strategically employed as a resource in educational settings. By recognising AI as a transformative resource, institutions can harness its potential to enhance teaching and learning experiences, ultimately contributing to improved educational outcomes. This theoretical framework serves as a guiding principle for

institutions seeking to maximise the benefits of AI in their pedagogical endeavours (Vasudevan, 2021; Cheng et al., 2022).

2.5.Pedagogical theories and models relevant to AI

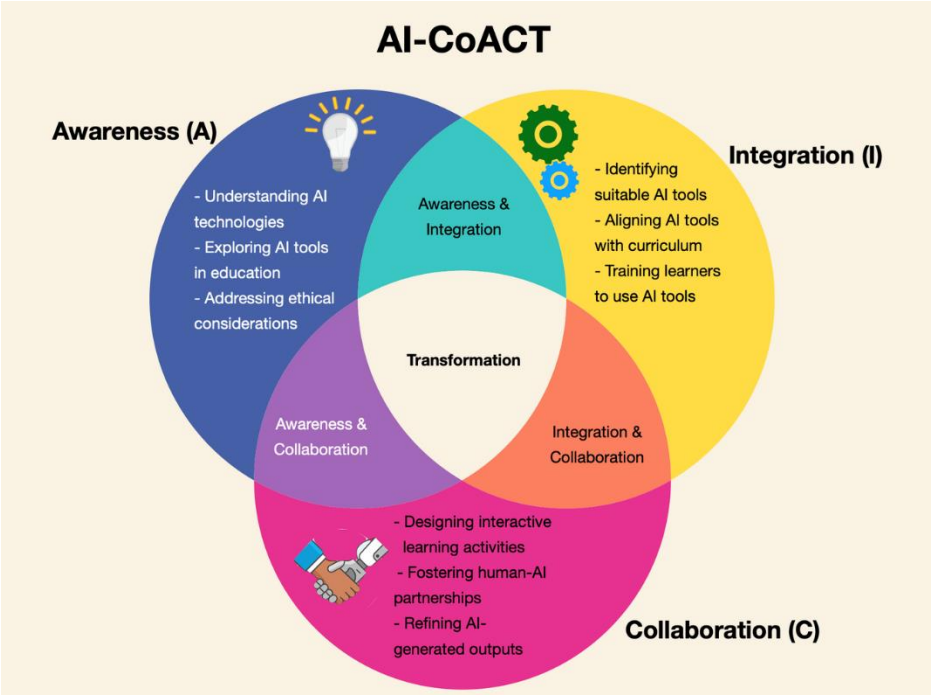
In order to enhance learning and teaching, AI applications, such as learning analytics systems and algorithm-based decision-making, have first proliferated in formal educational contexts, such as schools and universities (Katsamakas, 2024). Prospective advantages of these innovations include early detection of potential problems that students may encounter (Ravšelj et al, 2025), self-regulated learning skill scaffolding (Fan et al., 2021), and real-time help (Lucas et al., 2021; Martinez-Maldonado et al., (2022). But a lot of educators are still unclear about how AI can affect instruction (Southworth, et al, 2024). Furthermore, it is becoming clear that AI can exacerbate certain problems. For instance, by profiling students (Scarfe, 2024), measuring teacher performance for punitive purposes (Selwyn & Gašević, 2020), and implementing biased algorithms that can suggest deceptive behaviour (Almasri, 2024). Authors are beginning to wonder if the use of AI in education could foster particular worldviews that run the risk of sustaining colonialism modes of thought (Williamson & Eynon, 2020). It is argued by Knaus (2024) that there is a deficiency of critical thinking on the risks and challenges of AI and that ethical and AI-related education should be strengthened.

Gonzalez (2025) stated that global policy reactions have been sparked by the power and risk of AI. It is true that current AI policy initiatives have not sufficiently addressed the development of AI capacity, including learning about AI (i.e., comprehending what AI is and being AI literate), learning with AI (i.e., integrating AI into education), and learning for human-AI collaboration (i.e., surviving in an increasingly AI-integrated world) (Miao et al., 2021). The fear of job replacements has dominated discussions on AI's effects on society, with very little focus on the implications for education and skill development (Clark, 2025). In order to exploit AI's potential and fulfil the globally sustainable objective of high-quality education, UNESCO has also issued a number of recommendations. The main tenet of UNESCO's recommendations for AI in education is a "humanistic approach," which encompasses safeguarding human rights, giving

people the skills they need for sustainable development and human-machine collaboration in life, learning, and the workplace, as well as promoting human values that are essential for the creation and application of AI (Carvalho et al., 2022). The main suggestions made by UNESCO emphasise that using AI should

- Support educators in their efforts to enable co-creation of knowledge, human interaction, higher-order thinking, and human values; and
- Safeguard students' agency and social wellness (Carvalho et al., 2022).

Ward et al (2024), stated that pedagogical approaches prioritise human skills creativity, collaboration, critical thinking, and complex problem solving to support people in communicating and working with AI tools in life, education, and the workplace. Ifenthaler, and Yau (2023), proposed the adoption of a capabilities approach as a counter to this humanistic perspective. The problem space of designing for learning in an AI world includes humanistic methods, agency, co-creation, and wellbeing (Shabibi et al, 2024).



Source: Sweeny and McMullin (2023)

Figure 2.1: AI-CoACT framework

The "Artificial Intelligence for Co-Creation in Teaching" framework is known as "AI-CoACT." It is a theoretical framework created to make it easier for AI systems and human educators to work together on pedagogy, or teaching and learning. Using the combined strengths of AI and human teachers to create a learning environment that works well together is the main goal of AI-CoACT (Robayo-Pinzon et al., 2023). This framework is centred around a collaborative approach, wherein AI systems are viewed as intelligent tools that can augment and enhance the teaching process rather than as a substitute for educators. The following could be important AI-CoACT framework elements:

As the above framework indicates, *adaptive learning* ensures personalised learning by using AI systems that modify instructional strategies and content according to the needs of each individual student. Although adaptive learning offers intriguing opportunities for individualised instruction, a thorough analysis is necessary. According to Nye et al. (2019), *"there are differences in the*

results of various implementations," which highlights the need for careful assessment of the effectiveness of adaptive learning technologies. It is imperative to address *"the potential drawbacks of an over-reliance on adaptive systems"* (Arnold & Pistilli, 2012). Additionally, Lovett et al. (2015) note that *"differences in the learning gains of student subgroups are worthy of consideration,"* calling on educators and researchers to thoroughly assess the socioeconomic benefits of adaptive learning interventions. A balanced strategy is therefore required to utilise the advantages of adaptive learning while minimising any potential disadvantages.

Feedback methods: The framework includes methods that allow AI to give students timely, helpful feedback that will help them comprehend and advance (Robayo-Pinzon et al., 2023). Although the instantaneous nature of AI-driven feedback is recognised, its influence on learning outcomes needs to be carefully considered. The importance of feedback specificity and the ability of students to act upon it is emphasised by Protopapa et al, (2023). Katsamakas's (2024) concerns about possible misinterpretations or indifference to feedback highlight the necessity of a nuanced approach. Furthermore, as noted by Kirkwood and Price (2013), in order to promote a deep understanding, feedback must be in line with educational goals. It still needs to be easier to achieve a balance between the number and the value of feedback.

Data-Driven Insights: AI examines student performance data to assist educators in identifying areas for growth and modifying their pedagogical approaches accordingly. There are difficulties when using AI in education to rely on data-driven conclusions. Ethical considerations are raised by privacy concerns about the gathering and use of student data (Mouta et al, 2024). Learners may experience unforeseen repercussions as a result of algorithmic bias and inaccurate data interpretation (Selwyn, 2019). Educators must evaluate the algorithms' suggestions critically and take into account any educational consequences (Raffaghelli et al., 2020). The suitable application of AI in education necessitates finding a balance between resolving ethical issues and utilising insights for personalised learning (Yasdani-Asrami, 2023).

Resource Optimisation: To enhance the learning process, AI can recommend or supply additional materials like articles, videos, or interactive exercises. There are several things to consider when

using AI-driven resource optimisation in the educational setting. According to Kraus et al. (2024), although AI recommends additional resources, it can be difficult to guarantee their quality, applicability, and conformity to learning objectives. The diversity of learning materials could be restricted, and the value of human-curated information could be overlooked if algorithmic recommendations are relied upon excessively (Bayne & Ross, 2016). To stay clear of the possible hazards connected with algorithmic content recommendations, educators must continue to play a crucial role in the selection and contextualisation of resources (Williamson et al., 2020). Optimising educational resources effectively requires striking a balance between human expertise and AI-driven recommendations.

Administrative Support: Educators can concentrate more on instruction by using AI systems to manage administrative duties like scheduling, grading, and record-keeping. Although there are certain limitations, the incorporation of AI for administrative support for educational institutions shows potential. While automating grading and scheduling processes can increase productivity, it also raises concerns about job displacement and the necessity of human monitoring (Bond et al, 2024). The danger of relying heavily on AI in administrative positions makes it necessary to carefully assess the consequences of this technology for the teaching profession (Williamson et al., 2020). The integrity and human touch in educational settings must be preserved by achieving a balance between AI-supported administrative chores and the preservation of human judgement (Selwyn, 2019).

Ethical Considerations: To guarantee that AI is utilised morally and in a way that respects students' autonomy and privacy, the framework incorporates rules and protections. It is critical that the ethical implications of AI in education are addressed. Even though AI can improve education, issues with algorithmic biases, data security, and student privacy come up (De Cremer, and Kasparov, 2021). Concerns about accountability, transparency, and autonomy are among the ethical consequences of AI. Robust ethical frameworks are necessary to guarantee that AI technologies protect students' privacy and appreciate their autonomy. The proper use of AI in education requires finding a balance between creativity and moral obligation. The ethical issues

surrounding the use of AI in educational settings must be thoroughly investigated and evaluated on a regular basis (Dollinger et al., 2019; Chiu et al., 2021).

AI-CoACT understands that a collaborative effort is necessary for the successful integration of AI into pedagogy. It promotes constant connection and understanding between human educators and AI systems. The goal of this co-creative method is to minimise administrative responsibilities for educators while optimising the learning experience for students. Ultimately, AI-CoACT is an innovative approach to education in which AI is seen as a helpful collaborator in the classroom, collaborating with human teachers to produce the greatest learning outcomes (Robayo-Pinzon et al., 2023).

2.6: Overview of AI applications in higher education

AI is becoming more and more prevalent in consumers' lives as a result of its growing significance in a variety of daily activities, from media and entertainment consumption on digital platforms to online and physical shopping experiences (Chang *et al.,* 2023). As a result, organisational procedures have had to change to accommodate this reality shaped by technologies derived from computer science (Uribe-Saldarriaga et al., 2020; Matta et al., 2022). However, focusing only on the software development aspect of these solutions could ignore the multifaceted experience that users have with these technologies (Puntoni et al., 2021). Consequently, it is vital to investigate reactions to and experiences with AI in various contexts, including higher education. AI is the idea that machines are capable of thinking like humans (Wang et al, 2023). ML has been a widely accepted paradigm for the use of AI in several domains since the 1990s, and it has sped up innovation in fields like finance, education, and health. Organisations have become dependent on the wealth of data through digital platform interaction, which when properly analysed can produce information to inform business decisions at various levels (Rust, 2020; Jeon, 2022). Particularly in marketing, ML algorithms are being used more and more to support a range of functions that provide value to customers, including lower costs, more options for service channels, and chances to enhance the buying experience and after-sale support in product categories as varied as luxury goods (Bassano et al., 2020; Mustak et al., 2021).

As argued by various authors such as Suta et al., (2020), the AI solutions used in various procedures in HE varies in their state of development. Chatbots were the earliest of them. With so many people using smartphones and messaging apps, the market for chatbots has grown significantly in the last several years (Suta et al., 2020). The industries that have used this technology the most include food delivery, Fintech, e-commerce, health care apps, and even music instruction (Li & Wang, 2023; Viswanath Prakash & Das, 2020; Thomas, & Green, 2023). An AI tool known as a chatbot allows users to communicate with it via messaging applications and websites, whether they are in an open or closed domain. According to Mostafa and Kasamani (2022) and Martínez-Maldonado et al. (2022), the chatbot responds to general inquiries on a wide range of subjects in the open domain, but only to specific questions on a limited set of subjects in the closed domain. Education has long been the focus of chatbot development. They are divided into two categories: learning objectives and administrative process support, which includes helping students with procedures and offering advice on their academic path (Alimardani, 2024). According to Abbas (2024), instructional components provide students with customised materials based on their learning style and needs, making them a lifelong resource for their professional development.

Furthermore, according to the researcher's reading and experience, AI software has been created to generate grades and feedback for undergraduate courses automatically. One study examined how well a set of students performed in a coding lesson based on whether they got teacher-written or automatic feedback. Based on their performance on the subject tests, the students who got human input were able to apply their comprehension of the ideas and syntax of the algorithms more effectively (Brown and Ahmed, 2025). This implies that further study is required to understand how students interpret this information and its applicability in various contexts and procedures, and that these tools are still in their infancy (Leite & Blanco, 2020).

Finally, it has been suggested by (Gonzales, 2025) that software be developed to help with the adoption of mobile e-learning due to the increased penetration of smartphones and the rise in daily app usage time, particularly among younger users (Robayo-Pinzon et al., 2021). A prototype

software that integrated chatbot AI functionality with features to help students organise into groups for mobile collaborative learning has been tested through research. Students engage with both the chatbot and one another in these groups. Students did not utilise the chatbot to look for audio-visual content; instead, they used it to ask questions on academic topics, according to the results. Students also expressed great pleasure with the app's functionality and generally thought the instant messaging feature was simple to use (Chan & Fung, 2020).

The research of Ward et al, (2024), is focused on utilising the popularity of social networks among younger audiences as a means of facilitating learning through collaboration and communication features between educators and students (Ravšelj et al., 2025). Troussas et al. (2020) evaluated iLearnC, a Facebook-based smart coaching prototype designed to enhance coding course learning. With the help of this app, which makes use of Facebook's capabilities, students can receive personalised guidance from an AI-powered virtual coach on any conceptual gaps they may have in foundational course material. It additionally conducts assessments using Bloom's taxonomy and provides feedback on the outcomes. Judging from the results of the course's group of students' academic performance and pleasure, the app was highly well welcomed (Troussas et al., 2020).

The idea of the "machine teacher" or "AI-based teaching assistant" is another promising but still emerging option. It has been loosely defined as a technology that significantly improves human learning on multiple levels cognitive, affective, and behavioral by utilising various interaction techniques (Kim et al., 2020). It is possible for machine teaching to exist virtually or physically. Although there have been some documented instances of physically present robots being employed in educational settings (Sony AIBO or NAO), virtual machine teachers are more likely to be created (Li and Chen, 2024). Using data from the Technology Acceptance Model (TAM), a recent study examined how easy and useful it was to communicate with an AI-teaching assistant. The findings indicated that the intention to use the AI teaching assistant was positively influenced by perceived usefulness and simplicity of communication. It is possible to construct prototypes to test in academic environments due to the good attitude that students seem to have

towards the machine teacher notion (Kim et al., 2020). An additional suggestion is an ITS concept that integrates web-based information searches with an interface designed to educate information literacy using natural language processing techniques. The ITSs that have been put into service up to this point are concentrated on providing fast feedback while teaching extremely particular tasks. Currently, the goal is to employ natural language processing to broaden the range of activities to incorporate more complicated scenarios, which will allow the ITS to provide more thorough feedback (Libbrecht et al., 2020).

A recommendation system (RS), which retrieves and filters data based on a specified profile, is yet another example of AI in the classroom. The selection and retrieval of pertinent data for academic procedures has been utilised by RSs to support learning activities. Specifically, RSs have been used to advise students about potential training options, such as colleges, academic programmes, or subjects within a customised curriculum (Krause et al, 2024).

AI-driven learning personalisation has become a revolutionary force in higher educational institutions. Large-scale student data is analysed by AI technology, such as ML algorithms, to customise learning experiences and content for each individual student. By accommodating different learning styles, desires, and speeds, this customisation goes beyond conventional one-size-fits-all methods. As a consequence, students benefit from individualised help, feedback, and resources in a stronger and more interactive educational setting. Weng et al's (2024) research highlights the opportunity of AI-driven personalisation to optimise learning results by adjusting to the specific requirements of every student. Moreover, AI is used by adaptive learning systems to continuously improve the learning process in response to a student's performance, development, and understanding. These programmes deliver exercises and content that are specifically reshaped to a student's areas of strength and weakness based on data analytics and ML algorithms. These systems' adaptive features guarantee that students obtain individualised inputs, fostering conceptual mastery and averting the dissatisfaction or stagnation that can result from following a set curriculum (Weck et al, 2024). Another advanced use of AI in HE is through ITS. By simulating one-on-one tutoring sessions, these systems use sophisticated algorithms to give students

individualised advice and support. ITS seeks to mimic the efficacy of human tutors by examining individual learning patterns and modifying instructional tactics. The potential of ITS to promote thorough comprehension, problem-solving abilities, and academic achievement in higher-level educational environments is demonstrated by the research of Katsamakas et al. (2024) and Oyeyemi (2023) found that computers with AI features help to improve human capabilities an cognition.

In summary, the quick incorporation of AI applications in educational institutions presents a range of revolutionary opportunities, as demonstrated by the development of chatbots, automated grading schemes, and cutting-edge resources such as i-LearnC# and virtual machine instructors. Even while these developments are encouraging to students and show potential, it is important to recognise that these technologies are still in their infancy. Additional investigation is necessary to gain a thorough understanding of how students comprehend and utilise the data produced by AI tools, guaranteeing its effectiveness in a variety of learning environments. The advent of AI for educational purposes is creating opportunities for customised learning, mobile collaboration, and adaptive teaching. A balanced examination of the opportunities and difficulties will direct the successful integration of AI, influencing the future of higher education as society as a whole advance.

2.7: Benefits and challenges of integrating AI in pedagogic processes

Integrating AI into pedagogic processes presents both exciting opportunities and significant challenges. On one hand, the benefits of AI include personalised learning experiences, enhanced engagement, and improved efficiency in administrative tasks (Smith & Johnson, 2023). For instance, AI can transform educational content to individual student needs, ensuring that learners progress at their own pace (Kumar, 2024). Additionally, AI-driven tools can automate routine tasks, freeing up educators to focus on more complex aspects of teaching (Lee & Chen, 2025). However, challenges include concerns about data privacy, the risk of over-reliance on technology, and the potential for widening the digital divide (Patel, 2023). For example, while AI can provide personalised educational experiences, it may also raise questions about the security of

sensitive student information (Nguyen, 2024). Moreover, the implementation of AI requires substantial investment in infrastructure and training, which can be a challenge for some institutions (Brown & Ahmed, 2025).

2.7.1: Benefits

There are several basic applications for AI that could have distinct effects on how children and adults develop their cognitive capacities. To begin with, AI can complement current skills (Thomas & Green, 2023). AI can lessen the requirement for human knowledge, experience, and ability and elevate the significance of behavioural collections when competencies are viewed as mixtures of domain-specific expertise and behavioural repertoire (Bennett & Abusalem, 2024). The area-specific information that was previously necessary for competent behaviour is therefore no longer necessarily required for people to acquire. Specifically, Bennett & Abusalem, (2024) found that general competencies that are cross-domain and domain-independent may become comparatively more significant as domain-specific knowledge loses importance.

Secondly, AI has the potential to accelerate cognitive growth and generate cognitive capacities that would be unattainable without technology (Sharma, 2025). What would be inconceivable without technology is now possible due to the mechanisation of human labour; likewise, previously unimaginable new activities are made possible by the mechanisation of cognitive labour (Lopez, 2023). For example, without computer-aided design techniques that leverage vast amounts of design knowledge, designing a modern microprocessor or neural chip would be next to impossible (Nguyen & Patel, 2024).

Third, Evans (2023), suggested that some cognitive talents possessed by humans may become less significant or obsolete due to A. For instance, dyslexia may not be as significant in society if AI can translate speech to text and vice versa (Yusuf, 2025). Although AI can clearly assist individuals with conditions like dyslexia and dyscalculia, however, the total effect is difficult to forecast (Evans, 2023). Computers, for example, help people add and multiply numbers, but if people become overly dependent on computational devices, it might become harder to develop the

more complex mathematical abilities needed for number and mental arithmetic knowledge (Lopez, 2023).

From an educational perspective, it could occasionally be more advantageous to utilise AI to assist individuals in acquiring the skills necessary to overcome challenges with reading and counting rather of using AI to create unnecessary talents that support critical cognitive functions (Lopez, 2023).

AI-powered learning resources also have an enormous impact on raising student engagement. According to Einarsson, (2023), students' attention is stimulated by personalised learning experiences, interactive content, and adaptable learning platforms, which enhance learning and adapt to their specific requirements. According to Gardner et al. (2021), virtual assistants and chatbots offer prompt support, creating an exciting and dynamic learning environment that encourages involvement and interest. The difficulty of delivering high-quality education on a larger scale is solved by artificial intelligence's scalability in education. AI-driven platforms and applications have the capacity to reach a large student population, eradicating regional limitations and providing educational resources to a wider and more varied audience. Since it allows for more accessibility to high-quality education and maximises the use of available resources, scalability helps reduce costs (Li and Chen, 2024).

Yusuf (2025) found that AI tools can also personalise learning by adapting to individual student needs, automating repetitive tasks like grading, and providing instant feedback that helps students improve in real time. These adaptive learning experiences can significantly boost student engagement and academic outcomes. Moreover, AI can analyse vast amounts of educational data, identifying patterns and trends that allow HEIs to make data-driven decisions regarding instruction and assessment. This informed decision-making can lead to more effective teaching strategies, ultimately enhancing the overall educational experience for both students and educators (Srinivasa et al., 2022).

2.7.2: Challenges

My experience led me to believe that even though applying AI to education might present numerous benefits, there are certain challenges that must be resolved since they may negatively impact both people and society at large. The global higher education landscape will be significantly altered by this technology revolution. Therefore, before making any real adjustments, a more humanistic viewpoint for this type of schooling needs to be taken into account (Bennett, and Abusalem, 2024).

Ethics and privacy are important subjects that need to be explored more deeply and given more consideration. In this regard, massive volumes of private data and information that are obtained from university employees and students are required by AI systems, which can lead to major privacy concerns (Kengam, 2020; Benbya et al., 2020). An additional difficulty pertains to the advancement of AI technologies that rely on their users to improve communication. The advancement of AI communication technology may be negatively impacted by insults, lewd remarks, personal inquiries, and other unsuitable subjects (Krause et al, 2024). According to Bulathwela et al (2024), AI technology ought to be in line with an organisation's data security and privacy policies and legislation. As it is difficult to predict every possible interaction scenario, the results demonstrate that there are always queries that AI technology cannot answer.

However, as authors argued, in order to adapt and update AI technologies' answers, technical skills and knowledge of AI are required, which are typically lacking in teaching and support staff (Bulathwela et al, 2024). Additionally, while guaranteeing the security and reliability of AI-based systems, educational institutions will need to outfit them with the proper infrastructure. Furthermore, the expense of implementing, sustaining, and fixing AI is significant, and only educational institutions with substantial funding may be able to afford such advanced equipment (Kengam, 2020). Another contributing element is the fear of potential job loss that academic staff, librarians, and administrative personnel may feel. Furthermore, as a result of an addiction to non-human technology, AI applications in education may grow in the future, restricting human connection and personal interaction. Thus, rather than being helpful, AI

addiction can harm students (Kengam, 2020).

AI systems must take ethical and privacy concerns seriously when gathering and employing student data. When implementing AI in education responsibly, it is imperative to strike a balance between protecting students' rights to confidentiality and using data for personalised learning. Teachers' and students' acceptance is essential for the effective implementation of AI in the classroom. Education professionals must participate in training programmes, and open discussion regarding AI's role in education is crucial. Achieving acceptability and fostering collaboration between AI and human educators requires a comprehensive understanding of, and addressing concerns over the potential replacement of traditional teaching methods with AI (Li et al., 2022).

2.8: Pedagogical Implications of AI

According to researcher's research and experience, the use of AI in education is changing the way knowledge is learned and taught, bringing about a paradigm change in educational approaches. AI technologies, which are typified by cognitive computing and ML algorithms, have a number of revolutionary implications for education. The many pedagogical applications of AI are examined in this section, including data-driven decision-making, personalised learning experiences, adaptive instruction, and increased student engagement (Han et al., 2023).

2.8.1: Personalised Learning Experiences

With AI, educators can better meet the needs of each unique student and accommodate a variety of learning styles. AI customises information delivery according to each learner's aptitudes and development through adaptive learning systems (Salas-Pilco et al, 2022). This personalisation guarantees that every learner gets training in their preferred format and at their ideal speed, which improves understanding and retention in the end. According to Siemens and Long (2011), adaptive learning systems use algorithms to evaluate student performance and offer suggestions for focused interventions as well as real-time feedback.

2.8.2: Adaptive Instruction

According to Sallu & Hassan (2023), Learning management systems powered by AI can dynamically modify lessons and instructional strategies in reaction to student engagement. A smooth transition between various learning modes is made possible by this flexibility, which also takes into account kinesthetic, auditory, and visual learning preferences (Ragan et al, 2023). As argued by Shan et al (2021), an AI-driven system has the ability to identify when a student needs more practice on a certain idea and offer customised activities or resources to strengthen comprehension.

2.8.3: Enhanced Student Engagement

In order to increase student engagement, AI systems bring immersive and interactive components into the classroom (Qu et al, 2022). Real-time support is provided by chatbots and virtual assistants, who respond to inquiries and help whenever needed. Autonomy and self-directed learning are encouraged by this quick accessibility (Owan et al, 2023). Furthermore, courses can become interactive experiences with gamification components, made possible by AI algorithms, encouraging student participation and retention of the material (Mir et al., 2023).

2.8.4: Data-Driven Decision-Making

A significant volume of data about student performance and learning patterns may be collected and analysed more easily due to AI. Educators can use these insights to help them make well-informed decisions on the design of curricula, methods of instruction, and the distribution of resources. AI-powered analytics let educators customise interventions and offer more support where it's needed by recognising their students' areas of strength and weakness. In the end, data-driven decision-making results in more efficient and successful instructional strategies (Ogunleye et al., 2024).

In my (researcher) view, beyond traditional teaching techniques, AI has far-reaching educational ramifications that open up new avenues and make learning environments more dynamic and

responsive. The researcher believe that by utilising AI's capabilities, educators can enhance student engagement, provide individualised learning experiences, adapt education to meet individual needs, and make data-driven decisions for continuous improvement and make data-driven decisions for ongoing development by utilising AI's capabilities. With the potential to maximise student performance and lifelong learning, these transformative effects are well-positioned to shape the future of education (Han et al., 2023).

2.9: Influence of AI on Teaching Methodologies

In my (researcher) view, the integration of AI into teaching methodologies is transforming educational institutions, offering significant potential benefits across various aspects of the learning process. The researcher believe that AI-assisted technologies are increasingly being utilised to enhance teaching effectiveness, providing educators with innovative tools to support instruction, exercises, exams, assessments, and classroom management. From my (researcher) perspective, these advancements allow for more personalised, efficient, and data-driven approaches to education, serving the unique needs of students and improving overall learning outcomes. In this section, the researcher explores the influence of AI on different teaching methodologies, highlighting how, in my opinion, AI-assisted practices can lead to more effective and impactful teaching in contemporary educational settings. The researcher believe that AI-assisted teaching can evidently improve teaching effectiveness. In their discussion of the use of AI applications in education, Ahmad et al. (2021) discovered that social communication robots, intelligent learning, and intelligent teaching systems were crucial in helping students' repeated skill practises.

According to van der Niet and Bleakley (2021), AI technology is predicted to alter the way that medical education is taught. Specifically, the broad use of AI technology in medicine made it possible to move clinical work into the hazy realm of "technological enhancement" and create powerful virtual environments for use in medicine. According to Paranjape et al. (2022), AI support was necessary for medical practice, and AI-enabled medical equipment enhanced clinical decision-making by using more data. This allowed medical students to fulfil their repeated practice

requirements in man-machine interaction. According to Kraus et al's (2024) research, the integration of AI technology with educational instruction has improved educators' comprehension of the fundamentals of both learning and teaching while also assisting students in acquiring new knowledge and abilities.

2.9.1:AI-assisted exercise can evidently improve teaching effectiveness

According to Wang et al. (2021), traditional written exams were no longer able to satisfy students' exam requirements. This study created an exam system using AI that improved student performance in ability assessments by having strong cognitive diagnosing capabilities and achieving great efficiency and accuracy in question selection. According to Park et al. (2021), medical students who need to acquire medical AI-related abilities could have their talents evaluated using AI technology. Zhuravlova et al. (2021) discovered that students could take tests with AI assistance, increasing student quality and educational efficiency. AI technology was employed by Ebadi and Amini (2022) to help with English exams, which could boost students' confidence, enthusiasm, and drive to learn the language.

2.9.2: AI-assisted exams can evidently improve teaching effectiveness

According to Qu et al. (2022), combining AI with education will usher in a new era of educational development and advance quality instruction. AI might offer individualised lesson plans and satisfy the demands of intelligent student evaluation. According to Bobula (2024), there is potential for more intelligent and customised learning environments as well as a conducive environment for engaging in pertinent educational activities through the natural integration of AI technology and education. Furthermore, accurate descriptions of each learner's unique traits, a scientific assessment of instructional strategies and process design, and assurances of the execution of personalised teaching are all possible with AI-assisted education. According to Ouyang et al (2022), the implementation of AI in the new educational paradigm and its shifting functions to establish a customised learning environment are helpful in achieving comprehensive learning and evaluation procedures.

2.9.3:AI-assisted assessment can evidently improve teaching effectiveness

According to Wang and Cheng's (2021) research, AIED implementations should consider a differentiated approach in order to better address the needs of students and enhance the administration of instruction. According to Mostafa & Kasamani (2022), who examined the state of AI applications in higher education, AI will have a greater impact on future aspects of higher education worldwide, especially in the areas of teaching, learning, student support, and management. The advent of new technologies presents new chances for improving the education management process, according to Barakina et al. (2021), who felt that AI technology encourages the digitalisation of education. Observing shifts in students' perceptions about AI technology, Mouta et al (2024) conducted workshops on the subject. According to his research, educators would be more motivated to improve instruction if AI technology were to become more prevalent, and learners would require more assistance from AI.

2.9.4: AI-assisted management can evidently improve teaching effectiveness

Furthermore, the findings of Wood et al.'s study (2005) showed that educators' judgements of education technologies (ET) could disseminate knowledge and enhance their own learning effects. Educators' views of ET are improved, and their technological expertise is increased through the dissemination of AI information, which in turn increases the rate at which technologies are applied. Miao et al (2021) conducted a comprehensive interview with 37 participants spanning six academic areas. The author concluded that as educators started incorporating more sophisticated teaching technology into their lessons, they gathered more technological knowledge, which in turn raised their opinions on ET. Given the growing spreading efficiency, Miao et al (2021) discovered that more professors are familiar with AIED after gathering 84 completed surveys from students and faculty at a Swedish university. Research findings indicated that educators and students might receive individualised and professional support via online discussion forums(Seo et al, 2021). The development of the technological effect was also facilitated by educators' ability to better understand technology operation techniques through discussion with peers. The willingness to employ technology was higher among younger educators in particular.

2.10: Future Prospects of AI in Pedagogy

The prospects for AI in pedagogy are examined in this part, together with expected advancements, difficulties, and the wider influence on the field of education.

1. Personalised Learning at Scale: Providing large-scale personalised learning experiences is one of the most exciting applications of AI in education. With increased sophistication, AI algorithms will be able to examine enormous volumes of student data and customise lessons to fit each student's unique learning preferences, styles, and speeds. As a result, educational institutions will be able to offer high-quality, individualised instruction to a larger audience (Luckin et al, 2022).

2. Improved Evaluation and Response: AI-driven evaluation instruments could completely change how pupils are assessed. More precise and meaningful feedback can be obtained with adaptive assessments since they can dynamically change the level of questions based on a student's performance. According to Bobula (2024), AI can also automate the grading process, freeing up educators to concentrate on offering insightful comments and assistance.

3. Ongoing Virtual Classroom Growth: AI is probably going to be a major factor in the continued expansion of online learning and virtual classrooms. Chatbots and intelligent virtual assistants can help students in virtual environments right away, facilitating a smooth learning process. AI-driven content creation technologies can also assist instructors in creating dynamic and interesting online courses (Scarfe et al., 2024).

4. Data privacy and ethical considerations: As AI is incorporated into education more thoroughly, student consent and data privacy will become more crucial ethical issues. Strong frameworks must be established by educational institutions and legislators to guarantee the ethical and open use of student data. As argued by Einarsson, (2023), there should be unambiguous guidelines on the gathering, storing, and distribution of data.

5. Bridging the Tech Gap: Making sure that every student has equitable access to AI-driven learning materials will need work. The realisation of AI's full potential in education will depend

on closing the digital gap and granting equal access to technology. According to Luckin and Cukurova (2023), this includes programmes aimed at giving underprivileged people access to gadgets and internet connectivity.

2.11: Emerging AI technologies and their potential impact on education

AI technology opens up nearly limitless potential for the field of education. There are many studies that examined a broad range of AI applications in education, encompassing the following categories of educational technology:

- Visualisations
- Personalised learning systems or environments (PLS/E)
- Machine learning
- Intelligent tutors or agents
- Expert systems
- Chatbot
- Chat GPT

2.11.1: Visualisations and virtual learning environments (VLE)

The emergence of virtual reality (VR) technology has prompted studies into the possible advantages of using AI in education with visualisations and VLE. Students seemed to like learning in the VLE, as evidenced by their reports of how well it fostered group projects and learning (Bond et al., 2024). Educators also reported that pupils' engagement with the material had improved. Virtual reality (VR) and AI technologies have been discovered to work well together to enhance learning and engage Australia's younger learning population (Baidoo-Anu, & Ansah, 2023). According to this study, undergraduate students who were taught AI and VR also did better on

comprehension tests. According to Ward et al. (2024), a study conducted on a smart glass system, AI technology with visualisations aided in social communication for both adults and children with autism. However, participants' cognitive load increased when learning calligraphy in a mixed reality (MR) environment due to additional visual feedback, but this effect was unaffected by the user experience (Basheer, 2023). The contradictory research findings necessitate further study on AI visualisations and VLE as well as advancements in this kind of AI technology.

2.11.2: Personalised learning systems or environments (PLS/E)

It has been discovered that personalised learning environments, or PLS/E, are beneficial for promoting interactions and enhancing e-learning experiences (Scarfe et al, 2024; Alloghani et al, 2020). A study conducted by Turkish researchers (Bennett, and Abusalem, 2024), examined the effects of PLS on 110 undergraduate students over the course of two semesters of computer programming courses. They discovered that the PLS system enhanced students' learning experiences and assisted them in achieving desired learning results. Krause et al (2024) discovered in a different study that individualised mobile learning through AI and augmented reality (AR) enhanced both learning results and learning experiences in open computer education. The AI-enhanced e-learning system SmartTutor was the subject of a study conducted in Hong Kong with around 1300 participants (Mir et al., 2023). Additionally, it was discovered that faculty and students agreed that personalised learning tools and materials were beneficial to the process of teaching and learning. An ITS learning would be enhanced by linking math to students' extracurricular interests, according to a study conducted with high school students in the United States (Walkington & Bernacki, 2021). This suggests that highly personalised instruction could encourage learning and ultimately lead to student success.

2.11.3: Machine learning

Few research studies satisfied all requirements for thorough analyses in this study, despite the broad uses of Yasdani-Asrami (2023b), found that this significant AI technology was useful in evaluating how learners' styles changed in ESL/EFL over several grades. A different study found

that 74 per cent of undergraduate students' attitudes towards cloud-based mobile computing services as instructional tools may be predicted by ML algorithms based on how they handle their information (Yu and Xu, 2023).

2.11.4: Intelligent tutors or agents

According to Zhu et al, (2023), Learners receive assistance, materials, and comments from intelligent instructors or agents that are reshaped to their needs and delivered on time. Though research shows conflicting results regarding its benefits on learning, it has considerable promise. Take Teachable Agent (TA) as an example, which was the subject of a few research (Liang et al., 2023; Matsuda et al., 2020). According to Matsuda et al. (2020), TA helped elementary kids learn across grades and prepared students to acquire new science material from their normal courses even when they were not utilising the AI programme. Recent studies have looked at how preschoolers' gaze behaviours revealed their grasp of a TA-based math game. For example, according to Gulz et al. (2020), young infants viewed the TA as a separate entity. As a result, the researchers hypothesised that TA could provide metacognitive scaffolding. Matsuda et al. (2020) looked at how teaching a TA affected the learning outcomes of students in the seventh and eighth grades. The authors also discovered that while there was no variation across the three circumstances, students' problem-solving skills improved with the three TA treatments. Studies have indicated that teaching assistants (TAs) who possess a comparable degree of self-efficacy as the students they are working with could potentially enhance their students' arithmetic performance (Foltz et al., 2023). Xia et al. (2024) discovered that while practise and actionable feedback were crucial in the ITS for enhancing reading comprehension, metacognitive suggestions offered by the system did not enhance student performance. Lucas et al. (2021) discovered in another study that a courteous web-based instructor was more effective in promoting learning than a conventional web-based tutor for students with limited prior knowledge.

2.11.5: Expert system

Learning management systems (LMS) can be fully utilised for teaching and learning, according to AIEd research (Wang et al., 2021), which suggests that dynamic, holistic expert systems can assist with pedagogical planning. Using 1037 students and 75 professors in an LMS across several courses over the course of an academic year, Slimi (2021) conducted research on the quality of interactions in a blended learning environment. According to this study, an expert system's structural features can effectively simulate the ways in which LMS users engage with it, hence enhancing and streamlining the educational process on the platform. The effects of a picky expert system on the math learning results of Taiwanese elementary kids were examined in a study by (Hwang et al., 2020). Students' learning achievement in mathematics was higher in the experimental group in this study than it was in the other two groups. Furthermore, Hwang et al. (2020) discovered that the adaptive learning model incorporating affective and cognitive performance analysis was successful in lowering arithmetic anxiety in Taiwanese fifth graders.

2.11.6: Chatbot

There is only one research that specifically addresses chatbots in the classroom, and it has no bearing on academic results. Researchers examined the impact of chatbot partners versus human partners over a twelve-week period on 122 students' interest in taking foreign language programmes (Mahapatra, 2024). The study discovered that students' interest in chatbots decreased after just one week, and the results of the structural equation modelling showed that, when paired with a human partner, task interest predicted future course interest, but not when paired with a chatbot. Although researchers ascribed the decline in attention to the novelty effect, additional empirical study is needed to fully understand the impact of chatbots in education (Mahapatra, 2024).

2.11.7: Chat GPT

A growing body of research is being done on ChatGPT and its pedagogical applications, which reflects the growing use of AI in educational settings. Although there are studies in this

area, new research has concentrated on comprehending the advantages and disadvantages of using ChatGPT in educational contexts.

Research on ChatGPT's application in education frequently highlights the interactive and adaptable nature of the platform. As a natural language assistant, ChatGPT provides the potential for customised learning experiences. Studies show that the model can converse with students in regular language while offering immediate feedback and assistance, creating a dynamic and adaptable learning environment (Sharma & Yadav, 2022). Additionally, studies looking into the use of ChatGPT for tutoring and language learning have shown encouraging results. Given its ability to interpret genuine language, the model can help students learn languages by modelling real-life interactions. This could improve understanding, fluency, and language abilities while fostering a more immersive learning environment. Literature does, however, highlight several difficulties, as with any technological development in education. There are three reoccurring issues in AI: privacy concerns, ethical considerations, and the necessity of responsible deployment. Academics stress that prejudices in language models must be addressed, and that inclusive and sensitive educational practices must be made for a variety of learners. The literature also discusses educators' roles in assisting students in using ChatGPT effectively. Human interaction is still vital, even though AI can improve some areas of education. Research supports a comprehensive approach in which educators supervise and interpret AI-powered interactions to make sure the technology supports learning goals and continues to be morally upright (Huallpa, 2023; Mosaiyebzadeh et al., 2023).

2.12: The role of continuous professional development for educators

The researcher Zhou (2024) found that members of professional groups can maintain, enhance, and expand their knowledge and abilities as well as cultivate the character traits necessary for success in their careers through continuing professional development (or CPD). It can be characterised as a dedication to the systematic development of one's personal or professional ability. CPD, according to the Department for Education and Skills, is any activity that improves a teacher's abilities, expertise, or comprehension as well as their efficacy in the classroom. CPD is

defined as a reflective practice intended to enhance a person's qualities, comprehension, knowledge, and abilities (Seba et al, 2021). CPD is a flexible, educator-driven method in which educators develop lessons over time to give students and educators better and better learning and living experiences. The following are the tenets of continuous professional development that this study mentioned (Al-Masri, 2024).

Child and Youth Centred: Improving students' learning and lives is the ultimate goal of professional development for educators. This idea must be the main focus of any CPD programme that assists participants in making the connection between their learning and student results (Gartia & Sharma, 2013).

Focused on the Educator/Learner: Good Continuing Professional Development aims to teach educators new concepts and ideas that they may implement in their own work. It is imperative that educators and learners take the lead in creating professional development opportunities that enhance their own understanding, utilisation, and introspection (Gartia & Sharma, 2013).

Emphasis on Collective Exercise: Educators do not work by themselves. Educators and other stakeholders must collaborate to create successful learning programmes in order to satisfy the requirements of urban children and youth. This type of collaborative group learning and goal setting should be encouraged and supported through CPD (Gartia & Sharma, 2013).

Research-Oriented: Due to the efforts of educators in the community and at universities, the body of information pertaining to teaching and learning is always expanding and changing. A rising body of knowledge should be tapped into and added to by effective CPD (Kamalov *et al,* 2023).

Panel-Validated Use: The educator/learner should be the one who makes the self-assessment of the CPD results. The educator gathers data on the benefits of ongoing professional development at the right moments, and "friendly critics" who speak for a larger range of customers and professionals subsequently validate this data. Experiences with CPD should have an impact on teaching methods, student learning, and organisational capacity development (Mallik, & Gangopadhyay, 2023).

2.13: Potential for collaborative AI research between institutions

Academic research has become more globalised, bringing research institutions closer together while also subjecting them to ever-intense rivalry. As far as it is known, the interaction between these entities is typically referred to as co-opetition, which is the concurrent pursuit of cooperation and rivals. This leads to technical innovation, an improvement in shared advantages, and a proportionately larger part of the benefits gained (Gnyawali & Park, 2011). It is identical to educational teamwork and competitiveness. Research indicates that high-impact research is typically produced by both institutional cooperation and rivalry (Gazni & Didegah, 2011; Dong et al., 2018) and enhances academic achievement (Sajja *et al,* 2023). However, there are a lot of new issues for funding and research assessment policies as a result of growing competitiveness and partnerships inside and between research organisations. As such, a closer and more comprehensive examination of the academic cooperation network is warranted since it concurrently represents academic cooperation and rivalry. Interinstitutional co-opetition is actually of great interest to a large number of domain scholars, as evidenced by the numerous associated studies on global partnership (Lucking et al., 2023; Kuleto et al., 2021), funding partnership (Zhao et al., 2023), university-industry partnership (Susnjak, 2024), technological advancement, and industrialisation in cooperation (Seufert et al, 2021), among other topics.

Investigating the science of organisational competition and cooperation is crucial for certain fields, particularly those that are just getting started. AI has significantly altered our lives and ways of working over the past few decades (Coccia, 2020; Seeber et al., 2020), and it is quickly becoming a national strategy with wide-ranging industrial applications. Additionally, it impacts more general global environmental trends (Goralski & Tan, 2022). On the other hand, little is known about how AI develops itself (Balliammanda, 2021). The field of AI is growing quickly due to both cooperation and competition. However, given its rapid expansion, research institutes need to work together more closely.

1. Combining Knowledge and Resources: Through collaborative research, organisations can pool their distinct knowledge bases, resource bases, and strengths. An institution may possess

considerable expertise in educational psychology, but another may be a leader in the creation of AI algorithms. Through collaboration, educational institutions can more successfully address the complex issues surrounding AI-driven learning (Mah and Grob, 2024).

2. Diverse Perspectives and Approaches: Cooperative study design facilitates the exchange of ideas and methods among researchers who possess different histories, circumstances, and viewpoints. Due to this diversity, an extensive variety of concepts and techniques can be explored, which stimulates innovative thinking and creativity. According to Alqahtani, & Wafula (2024), multidisciplinary groups can produce more comprehensive and resilient solutions to intricate challenges by utilising a range of expertise.

3. Evaluating and Verifying AI Applications: In a variety of learning environments, collaborative research offers chances for thorough evaluation and verification of AI applications. Various educational settings, student populations, and instructional philosophies may be available at different institutions. According to Leoste et al. (2021), this enables researchers to evaluate the efficacy and scalability of AI-driven interventions over a wider range.

4. Ethical Aspects and Optimal Techniques: Working together promotes conversations about moral issues and the best methods for implementing AI in education. Issues like algorithm bias, data privacy, and responsible AI use can be addressed by institutions working together. Collaborative research projects have the potential to improve the ethical soundness and transparency of AI in education by developing common norms and guidelines (Leoste et al., 2021).

5. Enhanced Efficacy and Information Sharing: Cooperative research may increase the influence of AI-driven breakthroughs in education. Cooperation can yield results and solutions that are applied in a variety of educational settings and can reach a larger audience. According to Chiu (2024), this information sharing helps progress AIEd more broadly on an international level.

2.14: AI's impact on student learning outcomes

With the potential to greatly improve student learning outcomes, AI has become a valuable tool in education. AI systems have the capacity to adjust to the unique learning requirements of each student, offer tailored feedback, and support more productive teaching techniques through the use of ML algorithms and data-driven insights (Li et al., 2022). This section explores the complex effects of AI on learning outcomes for students, looking at how it affects retention, understanding, and engagement.

2.14.1: Personalised Learning Pathways

According to Brown, (2025) & Ahmed adaptive learning platforms powered by AI are revolutionising the classroom by customising information to meet the unique requirements and preferences of each learner. AI algorithms constantly modify the speed and complexity of instruction through ongoing performance analysis and assessment. By ensuring that students receive the material at a suitable level, this personalised method boosts retention and comprehension rates Patel, (2025). Research has demonstrated that individualised instruction boosts student engagement and improves academic performance (Bond et al, 2024).

2.14.2: Enhanced Engagement and Motivation

AI-powered resources bring immersive and interactive components into the classroom, stimulating students' curiosity and increasing participation (Smith, and Johnson,2023). In addition, Lopez, (2023) stated that virtual assistants and chatbots offer immediate assistance by quickly responding to questions and issues. Self-directed learning and a sense of freedom are encouraged by this accessibility. Furthermore, gamification strategies that are directed by AI algorithms turn teachings into interactive experiences (Thomas and Green, 2023). Students are encouraged to participate more actively in their learning process by using this gamified approach (Bobula, 2024).

2.14.3: Timely and Constructive Feedback

According to Yusuf (2025), AI systems enable real-time feedback, which is an essential component of education. AI can offer comprehensive feedback on homework, tests, and projects by means of automated evaluations and analysis of student submissions. In addition, Zhu et al., (2023) also found that students are able to pinpoint areas for growth and make the required modifications due to this timely input, which enhances their comprehension of the subject matter. Furthermore, students who receive feedback on a regular basis are encouraged to have a growth mindset and to cultivate a culture of continuous improvement (Dochy et al., 2021).

2.14.4: Adaptive Assessments and Mastery-Based Learning

AI makes it possible to create adaptive tests that change in response to student input. This guarantees that tests are suitably demanding, accurately determining each student's degree of proficiency. AI also facilitates mastery-based learning, in which learners move through the content at their own speed and must first demonstrate proficiency in order to advance. With this method, the emphasis is shifted from time-based learning to competency-based learning, enabling students to grasp the subject matter more thoroughly and deeply (Walter, 2024).

AI in education has enormous potential to improve student learning results. With the use of adaptive exams, timely feedback, personalised learning pathways, and improved levels of engagement, AI enables students to succeed academically. AI has the potential to completely transform education and open the door to more efficient and customised instruction as it develops and shows promise for improving learning outcomes (Li et al., 2022).

It is clear that AI systems have the ability to dramatically improve the performance of students when evaluating the revolutionary possibilities of AI in educational opportunities. By customising instruction to meet each learner's unique needs, AI-driven personalised learning paths, as noted by Bond et al. (2024) and Bobula (2024), improve retention and understanding rates. As espoused by Walter. (2024), the introduction of AI-driven resources, augmented reality (AR), and gaming methods promote increased motivation, involvement, and contribution, resulting in an age

of comprehensive and dynamic educational opportunities. Furthermore, as stressed by Dochy et al. (2021), the timely and helpful feedback provided by AI systems not only supports ongoing improvement but also fosters in pupils a growth mentality. According to , Almusaed et al., (2023)AI has made it possible to implement mastery-based learning and adaptive assessments, which guarantee a more complex assessment of students' abilities and move the focus from time-based to competency-based learning. However, according to Tewari, and Bose (2023) it is critical to recognise the possible drawbacks and concerns that come with AI being widely used in the classroom. To achieve a holistic view, issues including possible biases in algorithms, ethical concerns, and the necessity for a balanced approach to technology-dependent motivation ought to be rigorously explored (Liang et al, 2023)

2.15: Ethical considerations and implications of using AI in education

Students could benefit from more individualised learning experiences and better learning results from the application of AI in education. But, in order to guarantee that AI is applied responsibly and advantageously, certain ethical issues are also brought up by its use. Schools will rely on their education technology partners for many of these considerations. Organisations that work with education technology partners should thoroughly examine their procedures to see how these factors are considered (Li and Wang, 2021).

Privacy: Students' learning patterns, development, and behaviour are only a few of the personal data that AI systems gather in large quantities. Institutions of higher learning must make sure that this data is gathered and handled responsibly, transparently, and with the necessary data privacy safeguards in place. Clearly defined policies on the kinds of data that are gathered and how they will be used should be standardised and communicated to students in order to further protect student privacy (Li and Wang, 2021).

Transparency: The transparency and comprehensibility of the algorithms and decision-making procedures employed by AI systems must be guaranteed by educational establishments. Educators and students should be able to comprehend decision-making processes and, if necessary, dispute them (Remian, 2019).

Accountability: The decisions that AI systems make must be held accountable to educational institutions. Making sure all decisions are supported by pertinent and correct facts as well as legitimate and trustworthy outcomes is part of this (Li and Wang, 2021).

Human Oversight: AI programmes ought not to adopt the position of human educators or decision-makers. Human oversight is required for AI technologies to be used responsibly and fairly and for decisions to be made with the optimal benefit of students in mind (Remian, 2019).

Access: All pupils, regardless of their financial situation or level of handicap, should have access to AI systems. Institutions of higher learning must make sure AI technologies do not reinforce current educational disparities (Remian, 2019).

Safety: The physical and mental wellbeing of pupils must not be endangered by AI systems; hence educational institutions must make sure they are safe. To guarantee that AI is used in education in a way that is ethical, equitable, and advantageous to students, it is imperative that these ethical issues are addressed. AI systems must be employed in a way that supports beneficial learning outcomes for all students, which means that educational institutions must give ethical issues a first priority when building and implementing these systems (Remian, 2019).

2.16: Learning theories supporting the use of AI in education

2.16.1: Constructivism Theory

According to the constructivism theory of learning, people actively create their knowledge and understanding by engaging with the environment around them. According to this theory, which was developed by theorists like Lev Vygotsky and Jean Piaget, learning is not just the passive

assimilation of knowledge but rather an act of mental construction. According to constructivism, students are seen as active contributors to their education. They use what they already know and have experienced to help them make sense of the new information. Processes like analytical thinking, problem-solving, and reflection are used to achieve this. Students participate in activities that push them to investigate, ask questions, and find out more, which helps them grasp things at a deeper level (Loftus, and Madden, 2020). For instance, using the constructivist method in the classroom can include initiatives which inspire students to experiment and investigate, as well as hands-on exercises and group discussions. Through the provision of interactive simulations, individualised learning experiences, and real-time feedback derived from the learner's interactions, technology, including AI, can play a crucial role in constructivist learning. Furthermore, content may be customised to each learner's understanding level using AI-driven adaptive learning platforms, which makes it easier for individuals to construct knowledge at the speed and in the way that works best for them. This is consistent with the constructivist idea that education is a personalised, dynamic process (Sajja *et al,* 2023).

2.16.2: Social Learning Theory

Social Learning Theory places a strong emphasis on the contribution that social interactions make to learning (Bandura, 1977). This theory states that people learn from watching and imitating the actions, attitudes, and results of others in addition to their own experiences. Bandura popularised the idea of observational learning, which contends that people may learn by merely watching the behaviours of others. A number of variables, including motivation, focus, loyalty, and development, impact this learning. A student might, for example, try to use the same approach after witnessing a classmate complete a math problem successfully. Through online forums, collaborative platforms, and virtual communities, technology including AI can support social learning in an educational setting. AI-powered virtual assistants and chatbots can also operate as interactive learning partners by emulating social interactions and giving prompt feedback. This improves the learning process by fostering a sense of community and relatedness (Bandura, 1977).

2.16.3: Cognitive Load Theory

Cognitive Load Theory states that the amount of mental work or cognitive load necessary for assimilating information has an impact on learning (Sweller, 1994). The idea makes a distinction between germane load the cognitive effort committed to education and problem-solving and extraneous load, which is the mental strain imposed by instructional design. Intrinsic load is the inherent complexity of the content. Aiming to control cognitive load efficiently, instructional design should maximise learning. This can be accomplished by reducing the amount of unnecessary information presented, freeing up learners' cognitive resources to concentrate on comprehending and applying the content. AI's ability to convey content and provide adaptive education can be very helpful in managing cognitive load. By dynamically adjusting the content's complexity and structure according to each learner's unique profile, it makes sure that the educational materials are suitably difficult. This is in line with the ideas of cognitive load theory, which tries to maximise learning through cognitive load management (Sweller, 1994).

2.17: Pedagogical principles and AI integration

According to Walter (2024), well-established pedagogical principles are essential for directing efficient teaching tactics in the field of AI learning. These ideas offer a fundamental framework for maximising motivation, streamlining the learning process, and producing worthwhile results. In this section, fundamental theories and pedagogical concepts that are extremely pertinent to AI learning are discussed, and also highlighting the significance of these ideas for successful language teaching (Rakhmonov & Kurbonova, 2023).

2.17.1: Motivation

A key component of AI learning is motivation, which affects students' interest, tenacity, and eventual achievement (Slepankova, 2021). Students who have a sense of autonomy, competence, and relatedness are said to be intrinsically driven, according to the Self-Determination

Theory (SDT). By delivering individualised, dynamic, and captivating interactions that are consistent with SDT principles, integrating AI learning into teaching experiences will further boost motivation. Rakhmonov & Kurbonova, (2023), argues that by enabling students to independently use AI learning to guide them through their educational process, they may feel more competent and connected to the language they are learning Exposure

Several scholars have highlighted the Language exposure is essential for competency. Clear input is crucial for language learning, according to Krashen's Input Hypothesis. AI tools give students a lot of written language exposure, which helps them understand and learn within their language proficiency (Oyeyemi, 2023; Mir et al, 2023), It establishes a low-stress atmosphere in which students can try new things, get rapid feedback, and progressively increase their language comprehension and usage (Rakhmonov & Kurbonova, 2023).

2.17.2: Practical Activities

Hands-on exercises encourage participation and strengthen knowledge (Brown, 2024). According to Kolb's Experiential Learning Theory, knowledge is created by students through experience and reflection (Kolb, 1984). Learners can gain practical language experience through the integration of AI in tasks such as creative writing exercises or simulated dialogues (Nguyen & Patel, 2025).

According to (Mallik, & Gangopadhyay, 2023) h. By encouraging students to apply theoretical information in real-world situations, these exercises help them develop a deeper comprehension of language usage (Rakhmonov & Kurbonova, 2023).

2.17.3: Variation

Varied learning opportunities have stimulated engagement and interest (Thomas & Green, 2024). For learning to be effective, cognitive load must be managed, according to Cognitive Load Theory (Sweller, 1988). AI technology's flexible and varied responses may make learning exchanges more unpredictable (Patel, 2025). However, it also has the potential to deliver activities

that vary in difficulty and format, adapting complexity to match the skill levels of learners (Nguyen & Kumar, 2025). With this flexibility, learners' interests and motivation are maintained across the process of learning while simultaneously reducing cognitive burden (Rakhmonov & Kurbonova, 2023).

2.17.4: Positive Relationship

The development of an excellent connection between students and educators has a big influence on learning. The importance of imitation, modelling, and observational learning is emphasised by Bandura's (1977) Social Learning Theory. AI can enhance the learning process by giving students a safe, accepting, and easily available environment in which to practise their language abilities. However, it may only partially replace human interaction. This positive and motivating interaction can increase the self-assurance and openness of language learners (Rakhmonov & Kurbonova, 2023).

2.18: What AI means for teaching

Chen et al, (2025) argues that AI is transforming education and offering chances for teaching methods that could lead to radical change. According to Krause et al, (2025), AI has a significant influence on education, providing educators with effective instruments to improve learning outcomes, customise student experiences, and expedite administrative work. The potential of AI to deliver individualised learning experiences is one of its main benefits in education. AI techniques adapt lessons to each student's needs and learning style via adaptive learning systems(Lan and Zhou (2025), every student receives training at their ideal pace and comprehension level due to its dynamic material delivery and real-time feedback (Chen and Tsi, 2023). Additionally, AI enhances instruction by automating administrative duties, freeing up educators to devote more time and attention to teaching itself. AI systems are capable of handling routine tasks like scheduling, grading, and record-keeping with efficiency. By enabling educators to interact with pupils more meaningfully, automation creates an environment that is more stimulating for learning. AI gives educators data-driven insights into their students' performance

(Mir et al, 2023). AI can spot trends and offer insightful insights on both individual and collective progress by evaluating enormous volumes of data. Educators can choose curriculum design, interventions, and instructional tactics with knowledge due to this data-driven approach (Hudson and Plate, 2024). Furthermore, AI opens up new possibilities for accessible and inclusive learning. AI solutions can offer customised help and accommodations to learners with varying needs, guaranteeing equitable access to high-quality education for all pupils (Luckin & Cukurova, 2019). A comprehensive strategy is necessary when integrating AI into educational methods. Professional growth and training in AI integration are crucial for educators. In doing so, they guarantee that they can use AI tools to improve their teaching strategies and establish a lively and stimulating learning environment (Leoste et al., 2021). In my view, AI has the capacity to completely transform the way that an individual teaches. As highlighted by Chen et al. (2025), AI equips educators to deliver individualised instruction, automate administrative tasks, gain insights from student data, and promote diversity and inclusion in the classroom. According to Dewan et al. (2025), when educators adopt AI thoughtfully, they can create more efficient and engaging learning environments that ultimately benefit students and advance the field of education

2.18.1: Challenges and Concerns in implementing AI in Education

While integrating AI into education has many potential benefits, there are challenges as well. This section looks at the main challenges that organisations need to overcome in order to implement AI in classrooms.

2.18.1.1: Data privacy

When using AI in education, preserving ethical standards and protecting data privacy are of utmost importance. Strong and effective privacy safeguards are crucial when AI systems gather and examine enormous volumes of student data (Hutson and Plate, 2024). To ensure compliance with privacy requirements, institutions need to set explicit policies for the collection, storage, and sharing of data. Adopting AI ethically also requires being transparent about how data is used and

getting parents' and students' informed consent (Lucking et al., 2022). Institutions also need to take precautions against unapproved access and possible data breaches, which calls for strong cybersecurity safeguards. Encryption mechanisms and data anonymisation strategies are essential for protecting sensitive data and fostering stakeholder trust.

2.18.1.2: Dependence on technology and potential for reduced human interaction

AI improves personalised learning; however, high dependence on technology raises concerns because it may reduce human-to-human connections. It is critical to establish the right balance between AI-driven learning and conventional teaching techniques. Rather than taking the role of human relationships, educators need to make sure AI enhances them. According to Liu et al (2021), AI cannot fully replace the positive learning environment and holistic growth that is fostered by meaningful interactions.

2.18.1.3: Implementation barriers

Overcoming major implementation barriers will be required for the successful integration of AI in education. Accessibility to advanced AI may be hampered by budgetary constraints, particularly for smaller educational institutions (Smith, 2023). It can be difficult to get money for AI projects that include ongoing maintenance, software, and hardware.In my view, from the experience, it is also critical to make sure instructors have the abilities and know-how to use AI products efficiently. To equip educators with the self-assurance and skills necessary to fully utilise AI's potential, comprehensive training programmes and chances for professional development are crucial. Additionally, in order to facilitate AI integration, the current infrastructure might need to be upgraded. This includes having a strong network, enough computer power, and software that works with it. The smooth integration of AI in learning environments depends on overcoming these practical challenges (Smith, 2023).

2.18.1.4: Potential biases in AI algorithms

In my view, despite their strength, AI algorithms are vulnerable to biases in the training data. This may unintentionally create new prejudices or reinforce current disparities. From my perspective, AI might unintentionally reinforce biases in student results or grading, for example, if previous data indicates such discrepancies. In relation to it, Hu et al (2025), suggested that to reduce prejudices and advance equity and inclusivity, institutions need to thoroughly assess and improve AI algorithms.

2.19: Case Study Analysis: Coventry University (CU)

One well-known university with a reputation for using cutting-edge teaching methods is Coventry University (CU). CU has adopted AI in order to improve its teaching methods in recent years. The incorporation of AI at CU is explored in this case study, which looks at its instructional strategy, present uses, benefits seen, difficulties faced, and input from educators and students.

2.19.1: Overview of CU's educational approach and infrastructure

CU has a learner-centric approach to education, emphasising practical application and hands-on learning. The school emphasises employability skills heavily to make sure graduates are ready for the challenges of the working world. CU maintains cutting-edge facilities, such as contemporary classrooms, fully furnished laboratories, and collaborative learning areas, to support this methodology (Coventry University, 2024). Furthermore, CU has made investments in cutting-edge technological infrastructure, offering a strong basis for the incorporation of AI in pedagogy.

2.19.2: Current applications of AI in CU's pedagogic practices

According to my perception and experience CU has deliberately included AI in a number of its instructional strategies. Using platforms for adaptive learning powered by AI is one noteworthy application. These platforms provide tailored content and assessments by analysing each student's unique profile, incorporating information about their learning preferences and

performance. This guarantees that the teaching given to each student is customised to meet their unique needs and learning pace (Beta, 2024). In addition, CU uses AI-driven virtual assistants to offer students instant assistance. These virtual friends are available 24/7 and can respond to questions and concerns right away. According to Coventry University (2021), CU's learner-centric approach is in line with this accessibility, which encourages independence and self-directed learning.

2.19.3: Benefits observed, and challenges faced

AI algorithms have made personalised learning experiences possible, which has raised student motivation and engagement (Al-Samarraie, 2023). Additionally, educators may make well-informed decisions about their lessons due to AI-driven analytics, which give them useful data-driven insights into students' performance (Lameras, 2021). AI adoption in education is not without its difficulties, though. It is crucial to make sure educators have sufficient training and professional growth in AI integration. Furthermore, it is still crucial to address issues with data privacy and ethics in AI-driven teaching methods (Usher, 2024).

2.20: Conceptual Framework:

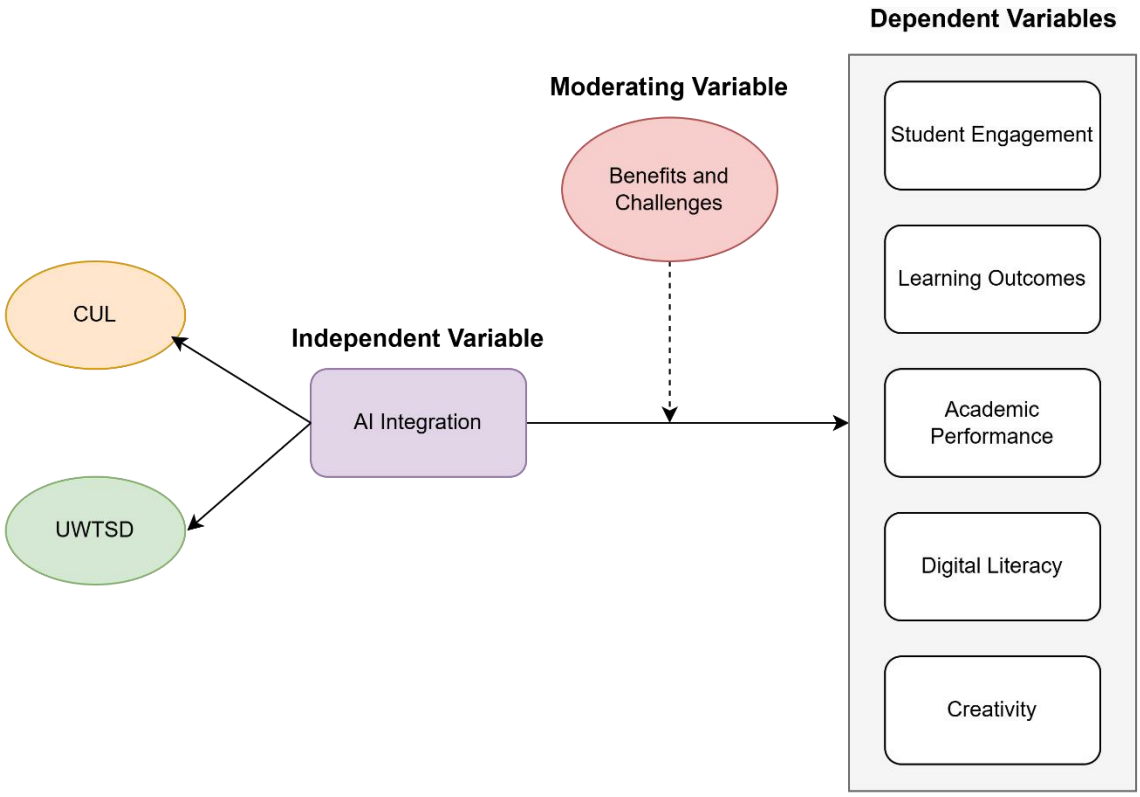


Figure 2.3: Conceptual Framework

Research Variables:

Independent Variable (IV): AI integration at CUL and UWTSD.

Moderating Variables (MV): Benefits and Challenges

Dependent Variables (DV): Student Engagement (SE), Learning Outcomes (LO), Academic Performance (AP), Digital Literacy (DL), and Creativity (CV).

2.27: Research Hypotheses:

H_{01}: The level of AI integration in pedagogic practices at CUL and UWTSD does not influence student engagement.

H_{a1}: The level of AI integration in pedagogic practices at CUL and UWTSD positively impacts student engagement.

H_{02}: The use of AI-driven tools does not significantly enhance student learning outcomes at CUL and UWTSD.

H_{a2}: The use of AI-driven tools significantly enhances student learning outcomes at CUL and UWTSD.

H_{03}: The use of AI-driven tools does not significantly improve overall academic performance at CUL and UWTSD.

H_{a3}: The use of AI-driven tools significantly improves overall academic performance at CUL and UWTSD.

H_{04}: AI integration does not significantly influence digital literacy among students and teachers at CUL and UWTSD.

H_{a4}: AI integration significantly influences digital literacy among students and teachers at CUL and UWTSD.

H_{05}: AI integration does not significantly improve creativity among students and teachers at CUL and UWTSD.

H_{a5}: AI integration significantly improves creativity among students and teachers at CUL and UWTSD.

H_{06}: There is no significant difference in the effectiveness of AI-driven tools between CUL and UWTSD in terms of student engagement.

H_{a6}: There is a significant difference in the effectiveness of AI-driven tools between CUL and UWTSD in terms of student engagement.

H_{07}: There is no significant difference in the effectiveness of AI-driven tools between CUL and

UWTSD in terms of learning outcomes.

H_{a7}: There is a significant difference in the effectiveness of AI-driven tools between CUL and UWTSD in terms of learning outcomes.

H_{08}: There is no significant difference in the effectiveness of AI-driven tools between CUL and UWTSD in terms of academic performance.

H_{a8}: There is a significant difference in the effectiveness of AI-driven tools between CUL and UWTSD in terms of academic performance.

H_{09}: Perceived benefits do not positively moderate the relationship between AI integration and student engagement at CUL and UWTSD.

H_{a9}: Perceived benefits positively moderate the relationship between AI integration and student engagement at CUL and UWTSD.

H_{010}: Perceived challenges do not positively moderate the relationship between AI integration and student academic performance at CUL and UWTSD.

H_{a10}: Perceived challenges positively moderate the relationship between AI integration and student academic performance at CUL and UWTSD.

The conceptual framework for this study explores the appropriateness and extent of integrating artificial intelligence (AI) in pedagogic practices at Coventry University (CU) and the University of Wales Trinity St David (UWTSD). The framework is structured around the following:

Independent Variable (IV): AI integration at CUL and UWTSD.

Moderating Variables (MV): Benefits and Challenges

Dependent Variables (DV): Student Engagement (SE), Learning Outcomes (LO), Academic Performance (AP), Digital Literacy (DL), and Creativity (CV).

2.21: Summary

In conclusion, this chapter has carefully examined the integration of AI into pedagogy within higher education. It began with an overview that set the foundation for a thorough investigation, providing context through a succinct synopsis that highlighted the transformative potential of AI for modern educational practice. The chapter recognised the profound implications of AI for teaching and learning, emphasising the importance of critically investigating its role and impact on pedagogy.

It presented the various ways AI applications are already enhancing teaching and learning environments from personalised instruction and adaptive learning to AI-driven tools for creative writing, chatbots, automated grading systems, and virtual learning assistants such as i-LearnC#. These examples demonstrate the breadth of AI's contribution to creating more dynamic, responsive, and engaging learning experiences.

The chapter also explored the theoretical underpinnings that guide the effective integration of AI in education. The Resource-Based Theory was discussed as a framework for leveraging AI as a valuable institutional asset. In addition, the compatibility of well-established educational theories such as constructivism and connectivism with AI-enhanced teaching practices was examined, showing how traditional pedagogy can align with technological innovation.

While acknowledging the clear benefits of AI including improved efficiency, scalability, and tailored learning pathways, this chapter also stressed the need for a balanced and critical perspective. It examined the challenges and limitations that accompany AI adoption, such as ethical concerns, data privacy, algorithmic bias, and the risk of over-reliance on technology. These challenges highlight the need to maintain fundamental aspects of human-centred teaching and ensure that technological integration does not undermine the relational and social dimensions of learning.

A complete examination of AI's role therefore requires addressing these complexities. Responsible and successful AI adoption must actively tackle potential implementation barriers, safeguard privacy, reduce biases, and uphold clear ethical standards. By proactively resolving these issues, institutions can maximise AI's benefits while minimising unintended consequences.

To illustrate practical applications, the chapter concluded with a comparative analysis of case studies from the University of Wales Trinity Saint David (UWTSD) and Coventry University (CU). These examples showed how institutions are deliberately embedding AI into pedagogical approaches to support learner-centred education, enhance individualised learning, streamline administrative tasks, and generate valuable insights from data. Despite existing challenges, CU's proactive strategies demonstrate a commitment to overcoming barriers and maximising AI's transformative potential in practice. Although AI holds enormous promise for revolutionising higher education, its appropriate and effective use depends on several interrelated factors: thoughtful implementation, student and teacher acceptance, balanced human–machine interaction, and robust ethical safeguards. A balanced approach one that weighs opportunities against risks — is vital to ensure AI strengthens rather than disrupts meaningful learning.

Overall, this literature review chapter provides a very good foundation for the research that follows. It offers a comprehensive understanding of the ethical, theoretical, and practical dimensions of AI integration in higher education, setting the stage for deeper exploration of how institutions like UWTSD and CU navigate this evolving landscape in practice.

Chapter Three: Methodology

3.1.Introduction

The methodology chapter serves as a guide for the empirical investigation to get a deeper understanding of the existing methods, difficulties, and potential advantages related to pedagogical interventions powered by artificial intelligence (AI), with a particular emphasis on Coventry University and the University of Wales Trinity St David. The purpose of this chapter is to describe in detail how the data were collected during your empirical evidence collection stage. This chapter offers two tasks in one. First of all, it illustrates the reason behind the decisions this study made and offers a strong justification for the methodology that was selected for this study. Second, it serves as a helpful manual that provides a detailed explanation of the methods used, guaranteeing that this research project is transparent and repeatable.

The chapter organised using a 'Research Onion' framework and it will provide a structured approach to planning and executing research projects The researcher begins with a general overview, which establishes the framework for the many levels including research design, data collection methods, research approach, data analysis of the research process. After that, the author peels back the metaphorical "research onion," revealing layer by layer the methodological underpinnings, strategy, design, and specific techniques used. Every succeeding segment builds on the one before it, offering a coherent and thorough flow through the complexities of the methodological approach. This chapter covers a wide range of investigative approaches, from the basic principles of research philosophy to the actualities of data collecting, sampling, and analysis. The purpose of implementing this hierarchical framework is to ensure that readers have a clear understanding and gain a deeper comprehension of the decisions made and the reasoning behind them.

The goal at the end of this chapter is for the reader to have a thorough understanding of the methodology as well as an appreciation of the careful consideration that goes into each methodological choice.

3.2.Research onion

Saunders et al. (2009) stated that methodology is the broad research plan that outlines when an investigation should be conducted. It comprises a set of beliefs and philosophical presumptions that influence how research questions guide the selection of research techniques. A dissertation research methodology is an essential component that helps to guarantee that the tools, procedures, and underpinning philosophy are all used consistently. In some approach to creating a research technique is based on the theoretical idea of the "research onion", which was put out by. The essential layers or steps that must be completed to build a successful technique are explained exhaustively in the research onion shown in Figure 1. Saunders et al. (2023) determined that the primary philosophy, selecting methodologies, methods, and plans, as well as setting time perspectives, are the first steps in the research methodology. These steps carry the study rationale to the design of the investigation, which consists of the primary processes and processes for gathering and analysing data.

3.2.1: Research Philosophy: The set of beliefs and assumptions that direct the manner in which a researcher comprehends and executes their research is referred to as research philosophy (Saunders et al., 2023). In essence, it is the fundamental framework that determines the formulation of research questions, the collection and analysis of data, and the interpretation of findings. It is essential to comprehend research philosophy, as it influences the methodology and methods selected for a study, and it guarantees the consistency and coherence of the research process (Yin, 2009). It defined the ontology, and the essence of actuality, epistemological theory or the origins and basis of understanding or the truth, and theology, or the ideals, convictions, and morals of the inquiry, to serve as the foundation for the study (Rubin, 2022).

3.2.2: Research Approach: It could be indirect from the research philosophy discussed above and often consists of the following steps: deductive thinking, which begins with an established theory, followed by the inquiry or assumption and the gathering of facts to support or invalidate the speculation; induction: the process of developing an argument during studies begins with observations and data collecting and progresses through presentation and evaluation;

disappearance: Once an observed phenomenon is noticed, researcher conducts studies to obtain the most accurate estimate or conclusion that can be drawn from the available data. While the inductive method is commonly used in areas with limited research, the deductive method is employed to evaluate established theories.

3.2.3. Methodological Choices: The process of methodological choice in research entails the selection of qualitative or quantitative methods in accordance with the research approach and objectives. In order to gain a comprehensive understanding of phenomena, experiences, or concepts, qualitative methods are frequently implemented in exploratory research (Saunders et al., 2023). This method enables the collection of detailed data from smaller, more focused samples, including interviews, focus groups, and ethnography. Conversely, quantitative methodologies are implemented for investigations that necessitate statistical analysis and measurement of variables across larger populations (Raithatha, 2017). Surveys, experiments, and numerical data analysis comprise this methodology, which is designed to verify hypotheses and identify trends.

The selection of qualitative or quantitative methodologies is contingent upon the theoretical framework that underpins the investigation and the nature of the research questions. For example, inductive research that seeks to develop theories from observed data is well-suited to a qualitative approach (Rubin, 2022). In contrast, deductive research, which employs structured data collection and analysis to test existing theories, is consistent with a quantitative approach (Miller & Ulrich, 2022). Researchers are able to design studies that effectively address their specific research aims and contribute meaningful insights to their fields by comprehending these methodological distinctions (Nowell et al., 2017).

3.2.4: Strategy: To collect the data and analyse by using the experimentation, interview types, survey Questionnaire, mixed method research, archival, case study, action research, grounded theory, ethnography and status of narrative inquiry. Various strategies, such as experimentation, interviews, surveys, mixed-method research, archival research, case studies, action research, grounded theory, ethnography, and narrative inquiry, can be implemented to effectively collect and analyse data.

Experimentation enables the controlled testing of hypotheses (Miller and Ulrich, 2022). Qualitative and quantitative data collection are facilitated by interviews and surveys, respectively (Saunders et al., 2023). Mixed-method research integrates both methodologies to provide a comprehensive understanding (Rubin, 2022). Archival research employs preexisting records, whereas case studies provide a comprehensive examination of particular situations. Action research emphasises practical problem-solving (Williams & Keady, 2022). Narrative inquiry investigates storytelling, ethnography investigates cultures, and grounded theory generates theories from data (Braun and Clarke, 2006).

3.2.5. Time Horizons: The timeframe for data collection is essential in this study to comprehend the behaviour and trends that have developed over time. This section delineates whether the study utilises a longitudinal or cross-sectional design. Insights into changes and developments are obtained through longitudinal studies, which involve repeated observations of the same participants over an extended period (Saunders et al., 2023). This approach is optimal for investigating the long-term consequences and progression of specific variables. In contrast, cross-sectional studies capture data at a single point in time, enabling the analysis of a snapshot of a specific phenomenon (Rubin, 2022). The value of both approaches is contingent upon the nature of the phenomena under investigation and the research objectives (Jaszczolt, 2018).

3.2.6. Techniques and Procedures: It described data collection from sample groups in the primary and secondary data like preparing the interview, development of survey questionnaire and semi-structured interview.

The researcher employs a variety of technological tools and structured procedures to collect data in this research, which includes both primary and secondary sources. This researcher prepares and conducts semi-structured interviews for primary data, which provide flexibility and depth, enabling detailed responses and follow-up questions (Saunders et al., 2023). Furthermore, survey questionnaires are designed to collect quantitative data from a broader sample from the students, thereby enabling statistical analysis (Rubin, 2022). Archival research methods are implemented to access existing records and databases for secondary data, which offers historical and comparative

perspectives (MacMillan, & Schumacher, 2001). This comprehensive approach guarantees the collection of reliable and robust data for comprehensive analysis. The current study has its research onion framework, as depicted in below figure (Figure 3.1):

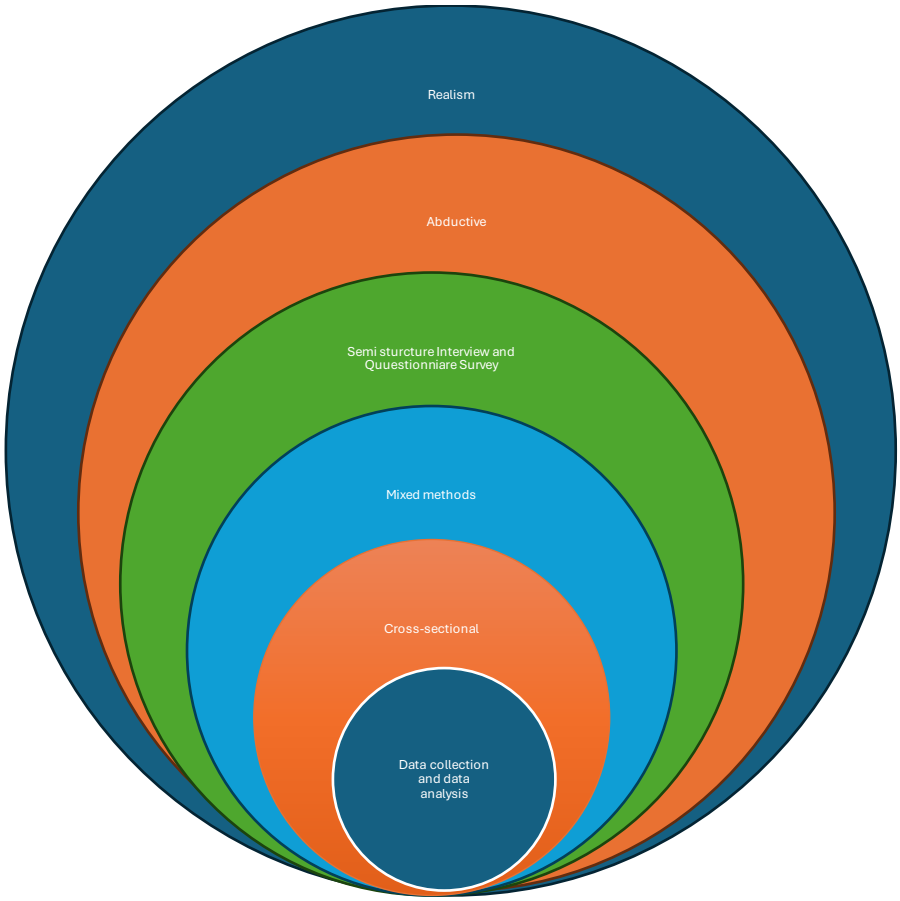


Figure 3.2: Research Onion *(Source: created by the researcher, 2024)*

Saunders et al. (2009) introduced the research onion was a technique that aids in structuring studies and developing study designs by systematically going through each section of the onion. However, it could be inappropriate utilising the investigation onion paradigm unchanged towards further study, however, given it initially appeared in corporate research. Selecting the options investigations is a distinct discipline of inquiry since it responds to events that continue to take time to pass. As a result, it is predicated on certain conceptual and philosophical beliefs that

influence the tactics, approaches, and methodologies chosen, that are different from those employed in business investigations. An examination of the scholarship on prospective research method has demonstrated this.

3.2: Research philosophy

Saunders et al. (2009) studied the viewpoint of research philosophies that an investigator takes in order to show their comprehension of the universe, which is then made public in their scientific study. Thus, research philosophy matters while developing a study's technique. It also informs the researcher's approach and explains how the investigator views the world. Consequently, the basic principle behind the investigator's worldview is to advance information using of the research study. In the field of business and leadership investigations, several primary conceptual paradigms have been recognised, namely positive thinking, interpretive thinking, postmodernism, critique of reality, and practicality. Each research method has a purpose and is essential to produce new information (Bell et al., 2022; Taylor & Medina, 2011).

3.3.1. Research Philosophical Framework

The research philosophical framework, specifically pragmatism, emphasises practical results and employs methods that most effectively challenge research inquiries. Pragmatism combines qualitative and quantitative approaches to achieve a thorough comprehension of intricate matters (Saunders et al., 2023). This adaptability enables a pragmatic and issue-focused methodology for conducting research (Rubin, 2022).

3.2.1.1.Epistemology

Saunders et al. (2009) regarded the hypotheses of knowing as a philosophical focus. Epistemology is an investigation of all recognised as expertise and widely accepted in research. It addresses the ideas of "what is known" and "which could be learned" (Bell et al., 2022, p23). Additionally, it pertains to the kind of understanding that is suitable, genuine, and reliable as well as how information could be shared among people (Bell et al., 2022). The Greek terms "episteme"

and "logos," that translate to "knowledge" and "theory," correspondingly, are the origin of the word epistemological. Accordingly, one may refer to epistemological as a "theory of knowledge". The epistemological is the rational extension of ontologies and is predicated on it. In contrast to ontology, which appears abstract, epistemology is more readily apparent and was deemed vitally significant in the subject of corporate study since it helps the researcher respond to the issue, "How to conduct the study project?" (Bell et al., 2022).

In this study, the epistemological approach is grounded in pragmatism, which prioritises the practical application of knowledge by embracing both qualitative and quantitative methods. This approach seeks to integrate diverse perspectives and methodologies to achieve a comprehensive understanding of the research problem. Pragmatism emphasises the usefulness of knowledge in real-world contexts, allowing the research to address complex issues with flexibility and relevance, ensuring that the findings are actionable and practically applicable.

3.2.1.2.Ontology

"Nature of reality" is related to ontology, an empirical framework for examining the fundamentals of what exists and pertinent classification. The Greek words "on" and "logos," which mean "being" and "theory," accordingly, are the roots of the term "ontology," which when combined means "theory of being" or "theorising about reality" (Bell et al., 2022). It outlines the researcher's perspective on and comprehension of the study's materials, or the way the scholar evaluates the company environment and managerial issues and chooses what to investigate for the study's purpose (Saunders et al., 2009). In this study, the ontological perspective aligns with pragmatism, which acknowledges the existence of multiple realities shaped by context and experience. This view accepts that reality is not singular or fixed but is instead influenced by practical outcomes and human interactions. Therefore, the research embraces a flexible understanding of the organisational environment, allowing for an exploration of various dimensions of reality as they relate to the study's objectives.

3.2.1.3.Axiology

Axiology explains the function and importance of ethical and moral principles in the scientific method. Since it influences the validity of the study's findings, it describes in detail how the researcher handles the principles of the investigation's respondents and their convictions throughout the conduct of the study. Human decisions and actions are based on standards, which also serve as the foundation for axiological abilities revealed during the study procedure. The selection of ideology also speaks to the investigator's worth since it indicates the data collection method used. For example, an academic that places greater emphasis on interpersonal connections would choose a study design where the method of interviews was employed to gather data. Being clear about one's value perspective also helps when showing "what ethically suitable exists," outlining opposing viewpoints during the investigation manipulate, and ultimately presenting the findings of the study (Saunders et al., 2009). In this research, axiology focuses on the ethical and moral principles guiding the study. It emphasises the importance of maintaining ethical integrity in interactions with participants and handling their beliefs respectfully throughout the research process. The researcher's values and standards influence how data is collected and interpreted, ensuring that the study respects the participants' perspectives and upholds ethical standards. This approach helps ensure that findings are both valid and ethically obtained, reflecting a commitment to responsible research practices.

3.2.2. Research Philosophical Paradigm

The selection of methods and interpretation of data in research is guided by the philosophical paradigm, which encompasses positivism, interpretivism, and pragmatism. Positivism employs empirical and measurable techniques, whereas interpretivism emphasises subjective and qualitative approaches in order to comprehend human experiences (Saunders et al., 2023). Pragmatism integrates both approaches, placing emphasis on practical solutions (Rubin, 2022).

3.2.2.1.Positivism

Using the ontological perspective of " societal fact" and the epistemology premise which produces "law-like" outcomes for inferences, the philosophy of positivism is linked to objectivity (Miller & Ulrich, 2022). According to positivism, actuality is visible and unchanging, and it can be explained from an objective vantage point without causing any harm to the subject of the research. With the assumption that neither prejudice nor human intervention can produce true information, such strategy results in the utilisation of neither technique from science for producing unique information or facts. The argument put out by positivists is that the object of inquiry has to be separated before being frequently viewed. Thus, taking positivism into account, scientists try to use natural science methods to investigate how society operates and how they are connected by deductive thinking (Taylor & Medina, 2011).

From an epistemological point of view, positivist inquiry regards that social thing as tangible and aims to provide significant and reliable data by seeing and measuring tangible data (Nosek et al, 2022). Results become generalised and a causal link between each factor in the information is established. These findings additionally allow for a forecast of prospective instances of likely incidents and actions. Based on ideas, facts, and visible truths that were previously given and verified via testing, assumptions are created. It should fail in whole and in particular, and it would be beneficial to the advancement of concepts and understandings that could be put to the test once more through more study. Scientists that follow positivist theories are autonomous, disengaged from their findings, and employ their own see as value-free methodologies (Bell et al., 2022).

3.2.2.2.Interpretivism

Saunders et al. (2009) introduced that interpretivism is as a subjectivity criticism of positive thinking. Interpretivism examined the significance that people attribute to things that do not depend on material facts. They defined social behavours and psychological intents and explained how individuals vary from things. Nonetheless, opinions of the scientists' individual interpretations

are equally significant in this regard, since interpretivism also generated several intellectual standards, including phenomenological interaction theory, and empiricism (Taylor & Medina, 2011).

According to interpretive thinking, humans and social environments cannot be investigated equally, given that various cultural backgrounds and life situations lead individuals to create various meanings at various times (Yin, 2009). It renders it difficult to establish a "universal law" on the subject, that positivists constantly strive (Williams & Keady, 2022). Accordingly, interpretivism analysis aims to create and innovate fresh, more accurate understandings and interpretations of people in their social environments (Saunders et al., 2009).

3.2.2.3.Pragmatism

The pragmatic philosophy emphasises that ideas are only deemed necessary and are made logical when they can facilitate action. It differed from the four ideologies that were previously discussed since it emphasised activity above merely conceptual frameworks. Subjectivity and objectivity, values and information, precise and value expertise, and situated experiences are all attempted to be reconciled by pragmatics. It holds that taking initiative is the best way to solve the issues. In pragmatic inquiry, a dilemma was the starting point, and the intent was to provide workable concepts for possible courses of action, and the most widely used pragmatist approaches combine objective and subjective methodologies. Thus, in a multi-scenario context, pragmatic made logic. This has been accomplished by considering theories, ideas, thoughts, assumptions, and research findings in abstract terms, seeing them experimentally, and recognising their applicable ramifications. According to pragmatic people, the ideas and concepts' applicability constitute genuine "reality," and successful applications in real-world situations acquire understanding (Saunders et al., 2009).

3.2.2.4: Realism

As a research philosophy, realism seeks to understand the nature of reality so it will exist independent of human realisation, knowledge, and desire, through our senses. Realism supports this research on AI use in higher education because it gives a practical lens to the study of the way that AI interacts subjectively with learners and educators as well as objectively. Realism is based on the concept that there is an external reality that is totally separate from human thoughts and experiences. That reality can be learned, can be known; but it is known and learned and studied through social construction and social experiences. For example, the physical deployment and performance of AI tools in higher educational utilisation, the official policies-emphasising their deployment, and the collective behaviors and works of students and teachers with these machines (Bell et al., 2022). Since AI is still in its beginning, there really cannot be a definite case by one party or the other of it as a key factor in education because no one really knows whether it is or not at this stage. Due to the way that the average human brain works, each person is going to have their own experiences and perceptions about the effectiveness and necessity of AI in education based on their background knowledge, cultural background, level of comfort with technology, and specific educational objectives (Eriksson & Kovalainen, 2015). Realism is directed towards discovering the causal mechanisms which are responsible for given events that are observable. Which for tis research study may be looking at the underlying intricacies that determine the adoption or non-adoption of AI tools like attending university/colleges (higher education) endorsement, perceived benefits arising from the use of an AI, data protection concerns, and the impact of AI on pedagogy (Saunders et al, 2009).

3.2.2.5: Justification of the Chosen Research Philosophy

This research is underpinned by a critical realist philosophy. Critical realism is appropriate because it accepts that an independent reality exists, such as the measurable impacts of AI on engagement and creativity, while also recognising that this reality is experienced subjectively by students and educators within their social and institutional contexts.

Although pragmatism informed some methodological choices by encouraging flexibility in combining qualitative and quantitative methods, the fundamental ontological and epistemological stance of this study is critical realism. This ensures consistency between the research questions, the mixed-methods approach, and the aim of capturing both objective outcomes and subjective experiences.

These modes provide the ability to articulate and capture the technical practices and personal experiences of Investigating the appropriateness and extent of AI for pedagogic practices in higher education. This study considers that the use of semi-structured interviews with a realist perspective is particularly useful as it helps to gain greater insight into both objective and subjective sides of AI use in education. Interviews provide a specific and detailed series of data on the implementation and operation of AI tools, including insights on how it will work, what is understood to be the most successful or problematic uses and the rules that regulate AI use within educational environments (Bell et al., 2022).

Interviews yield detailed qualitative data on individual: experiences attitudes opinions perceptions of AI Use to understand how technologies are perceived and interpreted differently by different groups of stakeholders (Eriksson & Kovalainen, 2015). Semi-structured interviews are flexible and follow up interesting aspects such as how institutional cultural frameworks or past experiences with technologies inform participants' concepts of AI (Saunders et al., 2009). Questionnaire surveys complement this realist approach, offering structured, quantitative information which can be systematically analysed to look for patterns and trends. Surveys may reveal common trends in AI usage in education, establishing a general understanding of adoption and usage of AI tools (Bell et al., 2022). Survey data to validate qualitative findings from interviews. To a question of training needs following the interviews: If it appears that all interviewees seem to be requesting better knowledge of AI tools, survey responses can show if that requirement holds true across a larger sample (Eriksson & Kovalainen, 2015).

The foundation of philosophy underlying this research in realism is validated by the requirement to represent the concrete realities and interpretive subjective states of AI engagement in education. Realism provides an explanatory account of how AI tools are objectively employed in higher educational systems by understanding the multitude of personal and complex application experiences and perceptions that play a role in their integration. The dual perspective is necessary to identify the complicated dynamics involved in the diffusion and sustainability of AI in education. Realism supports the mixed method approach. Such an approach will play to choosing semi-structured interviews, with the quantitative trends that come out of a questionnaire survey. This is consistent with the goal to find the true causes of AI adoption and use - to develop a richer, more multi-dimensional view of these complex interactive phenomena. Realism incorporates both the objective circumstances and the subjective perceptions, providing an equitable standard for identifying more meaningful, applicable solutions to promote AI integration in HEIs.

3.4: Research approach

The application of theory is a component of research projects. As a result, the research project design is also influenced by the intended research question, which is related to inductive, deductive, and abductive theory development or testing (Saunders et al., 2009; Easterby-Smith et al., 2021).

3.4.1. Inductive Approach

According to Saunders et al. (2009), a conceptual framework is crucial for developing theories when investigating a phenomenon using an inductive approach. Within the scope of this research, this implies that instead of commencing with a preconceived hypothesis regarding the utilisation of AI in education, you are permitting the data obtained from participants to guide and mould your comprehension.

The objective of this research is to investigate the appropriateness and extent of artificial intelligence (AI) for pedagogic purposes at CU & UWTSD. Through the utilisation of comprehensive interviews and surveys, this acquires meticulous qualitative and quantitative data.

During this process, it analyses the interactions between these individuals and AI, identify the factors that affect their decision-making, and examine the variations in their experiences. The patterns and regularities that arise from this data serve as the foundation for the conceptual framework. As an illustration, one may observe a consistent pattern in which students display eagerness towards AI tools that aid in personalised learning, while also expressing apprehension towards tools that monitor their activities. This observation can potentially contribute to the formulation of a theory regarding the dualistic nature of AI acceptance, which is influenced by both its perceived advantages and the implications it has on privacy.

This research is focused on investigating the appropriateness and extent of artificial intelligence (AI) for pedagogic purposes at CU & UWTSD. To develop theories, the researcher uses the inductive method, which involves drawing conclusions based on observed data. Employing a conceptual framework, I collect data to investigate the application and consequences of AI in higher education, adhering to the inductive approach outlined by Saunders et al. (2009). This approach facilitates the recognition of patterns and consistencies in the data, which in turn enables the development of theoretical inferences (Eriksson & Kovalainen, 2015).

The flexibility of the inductive method makes a small sample size helpful as it enables a detailed examination of specific contexts where AI integration takes place (Bell et al., 2022). This approach is especially advantageous for my research as it allows for a thorough investigation of how AI tools are utilised in pedagogical practices and their efficacy in improving learning experiences at CU and UWTSD.

3.4.2. Deductive Approach

An existing theory created by examining academic literature and literature advice is linked to a deductive approach, and This study aims to conduct a comprehensive analysis and assessment of the appropriateness, efficacy, and extent of AI implementation in the context of educational endeavors within higher education institutions. A research plan is created to evaluate the idea.

Thus, a theory is formed, and hypotheses are then constructed in response. The hypothesis has been tested through the construction of a research strategy, and the final results are reported following analysis of the experiments (Saunders et al., 2009). As a result, most of the knowledge obtained using the deduction approach has been relied on previously published works (Bell et al., 2022). Using this method, a causal association between concepts and variables is examined by formulating pertinent hypotheses and, typically, by gathering quantitative data, as this facilitates the operationalisation of the study. According to Saunders et al. (2009), the deduction approach is also useful for generalising the findings.

For this research at Coventry University (CU) and the University of Wales Trinity St David (UWTSD), the researcher uses a deductive approach to examine the suitability and scope of AI for educational purposes. This involves testing established theories from existing academic literature. This entails developing a research plan to assess the theoretical framework by formulating hypotheses based on the existing literature (Saunders et al., 2009). More precisely, the researcher develops hypotheses regarding the efficacy and incorporation of AI in higher education. Subsequently, the researcher devises a research plan to empirically examine and evaluate these hypotheses.

The deductive approach entails the gathering of quantitative data through the use of questionnaire surveys and semi-structured interviews. This approach aids in the operationalisation of the study (Bell et al., 2022). Through the examination of this data, the researcher can evaluate the hypotheses and make inferences about the cause-and-effect connections between the utilisation of AI and educational results. This approach facilitates the extrapolation of conclusions, offering more comprehensive understanding of the involvement of AI in education, as it depends on preexisting literature and established principles to direct the research procedure (Saunders et al., 2009).

3.4.3. Abduction Approach

The deduction and the induction approaches go from theory to data and data to theory (Miller & Ulrich, 2022). However, the approach of abduction integrates the ideas of induction and deduction, and most scholars studying management and business actually follow this approach (Easterby-Smith et al., 2021). In order to develop new or improved ideas that have been tested through the collection of more data, data is first collected to investigate the phenomenon, find themes, and explain trends. Until more trustworthy outcomes are obtained, the process is repeated (Saunders et al., 2009).

3.4.4. Justification of the Chosen Research Approach

The current research employed an abductive approach, combining ideas of induction and deduction, by looking at data and drawing new theories and ideas from it. It also examines previously studied phenomena from different angles and draws on pre-existing theories. The abductive approach is suitable for this research because it permits adaptability and receptiveness to novel insights throughout the study. At first, the researcher collects qualitative data by conducting semi-structured interviews to investigate the utilisation of AI in pedagogical practices. This process involves identifying patterns and generating hypotheses through inductive reasoning. The hypotheses are subsequently examined deductively by employing quantitative data obtained from structured surveys, thereby ensuring that the conclusions are firmly based on empirical evidence.

This iterative process facilitates a thorough comprehension of the role of AI in higher education, accommodating the intricate and ever-changing nature of the research topic. The abductive approach guarantees a well-rounded and careful investigation by alternating between theory generation and testing, resulting in strong and actionable insights.

To gain a thorough understanding of the study phenomenon under investigation and to address the research questions, data was gathered using close ended questionnaire as well as semi-structured interviews. The acquired data was then analysed using existing theories and literature

to produce tangible outcomes. Abductive thinking emphasises adaptability and refinement, which is essential for reacting to the complex and dynamic circumstances impacting students' decisions. Overall, the study is guided towards a comprehensive and nuanced examination of the complex terrain of factors influencing the appropriateness and extent of AI for pedagogic purposes by the abductive reasoning methodology, which acts as a methodological compass.

3.5.Research design

Research design has been defined as the overall strategy for addressing the research question (Saunders et al., 2023). It explained the thoughtful choices that were made about the methods of gathering data, the procedure for analysing data, the ethical problems that were raised, and the practical limitations that the research project faced. Funding, location, data accessibility, and time constraints were some of these constraints (Bell et al., 2022).

Three methodological options broadly defined as mixed-method, qualitative, and quantitative research designs are recognised (Easterby-Smith et al., 2021). The type of data whether it be numeric (numbers), non-numeric (pictures, language sound, or video files), or a combination of both numeric and non-numeric characteristics is the basis for differentiation among various study methodologies (Saunders et al., 2009).

3.5.1. Mixed Method Research Design

The use of mixed methods is a well-established technique in data collection. Many researchers have utilised this method as it provides a very good understanding of research issues (Mander, 2023 and Natow, 2020). It helps to address various complexities of world issues, contributing both numerical analysis and in-depth understanding of the issues.

The two philosophical presumptions are critical realism and pragmatism. It has been determined that the abductive, deductive, or inductive methods of theory development are pertinent to mixed-method study designs. This notion involves combining various research modalities into a single study topic, incorporating both quantitative and qualitative analytical

methods and data collection approaches. The integration of quantitative and qualitative approaches in mixed methods research can take numerous forms, resulting in simple, complicated, simultaneous, or consecutive forms. These various mixes of quantitative and qualitative methodologies are combined based on the type of research questions being asked and the desired goals that are being accomplished (Saunders et al., 2009).

According to the findings of Bryman and Bell (2007), combining qualitative and quantitative research techniques will produce extra findings and will enrich the data result. The limitation of employing either simply a qualitative or only a quantitative strategy can be circumvented by making use of a methodology that combines qualitative and quantitative research techniques. For instance, combining qualitative and quantitative research may be able to overcome these issues (weaknesses of each approach) and improve generalisation, provide stronger evidence for a conclusion, and can add insights and understanding that might be missed when only a single method is used (Crump and Logan, 2008; Greene, 2008). These findings were published in Crump and Logan (2008) and Greene (2008). The mixed methods approach is described by Saunders et al. (2009, p 152) as "the general term for when both quantitative and qualitative data collection techniques and analysis procedures are used in a research design." Another factor that must be considered in relation to the investigation is the size of the samples used.

3.5.2. Justification of the Chosen Research Design

This study utilises a mixed-methods research design to investigate the various factors that impact the utilisation of AI in education among students and educators. This approach employs a combination of qualitative and quantitative methodologies to attain a thorough comprehension of the decision-making processes associated with the integration of AI into educational practices.

The use of qualitative components of the research centres on acquiring comprehensive insights through conducting in-depth interviews. The purpose of these interviews is to gather the individual experiences, motivations, and concerns of students and educators regarding the implementation of AI in educational environments. This method enables participants to express their thoughts using

their own language, resulting in a diverse range of detailed and subtle viewpoints. This level of comprehension is especially valuable for elucidating the intricacies of individual decision-making processes and the underlying factors that impact these choices.

In addition to the qualitative data, the study also utilises a quantitative approach by conducting a survey using a structured questionnaire. This survey gathers quantitative data from a diverse population, with the goal of identifying trends and patterns that may not be readily apparent through qualitative analysis alone. The standardised format of the survey enables easy comparison of responses among a substantial number of participants. This approach enables the identification of prevalent patterns and the projection of outcomes to a broader population, offering a high-level viewpoint on the factors that impact the adoption of AI in education.

The incorporation of qualitative and quantitative methodologies in this mixed-methods framework yields a more comprehensive perspective than either approach could individually attain. The qualitative insights obtained from conducting in-depth interviews serve to provide context and elucidate the underlying reasons for the trends observed in the quantitative survey data. In contrast, the quantitative results corroborate and authenticate the qualitative data by providing a comprehensive summary that can be applied to a larger population. Adopting this two-pronged strategy is essential for comprehensively understanding the various elements that influence the choices made by students and educators when it comes to utilising AI in educational settings.

Overall, the utilisation of a mixed-methods research design in this study enables a comprehensive and detailed examination of the intricate dynamics associated with the implementation of AI in education. This approach offers a comprehensive comprehension of the various factors that influence these crucial decisions by combining detailed personal narratives with extensive statistical analysis.

3.6.Population, Sample, and Sampling techniques

Population is defined as the set of particular groups either human or non-human entities, like geographical areas, time units, educational institutions, objects, wheat prices, or salaries of general public. It is also referred to as 'universe population' (Ali et al., 2023).

Moreover, there are two types of population: finite and infinite populations. In finite population type, the number of individuals is finite, whereas the set of units, members, or individuals is referred to as class. On the other hand, in infinite population type, the number of individuals is infinite (Saunders et al., 2023). An example for infinite population has been the population of atmospheric pressures in different points (Baake & Herms, 2008). If the unit of the population has been present in solid form, it is known as 'existent population'; otherwise, it is called as 'hypothetical population'. An example for existent population comprised all the 233 students of business department of specific university; example for hypothetical population is the infinite number of coins tossing to obtain heads and tails. It has been necessary to clearly define the population in order to remove ambiguity whether the particular unit is part of the population (Bhushan et al., 2023). For instance, in mathematical studies, the student population have to clearly defined based on their grade (marks) or age and also, if needed, the institution type, geographical location of the institution, and the academic year for which the data will be collected. Simpson (2013) argued that the population units and its characteristics need to be well recognised to draw conclusions about the populations. Otherwise, the selection of sample units will be hard. The students and academicians from both CU and UWTSD institutions make up the population for the study.

Sample is a term in research and defined as a particular subset of the population that has been chosen (Ekitan & Bala, 2017). The whole population and their characteristics have been known by studying the samples. It has been presumed that studying and analysing the samples will represent the whole population chosen for the study. However, this decides based on how the samples are chosen. The presumption has been true only if the samples are replicated the actual population; otherwise, the presumption becomes invalid (Ekitan & Bala, 2017). If the value produced from a

chosen sample differs greatly from the actual population, then this sample has been referred to as 'biased sample'. Therefore, inferential studies need to be carefully select the samples i.e., the samples should represent the population. A sample that encompasses attributes in the same degree or proportion as the population as a whole has been referred to as 'representative sample'. Randomly selecting samples from large populations can help in eliminating bias since it produces only small errors that can be measured also. Hence, a study should choose samples that are free from bias (unbiased) representative and random samples (Watson & Moritz, 2000).

Sampling is a technique that helps to choose samples from the population. For choosing samples, the population has been split up into different units, i.e., sampling units (Ritchie et al., 2013). For example, a large number of sampling units can be seen in academic studies. Universal validity can be achieved by testing, interviewing, or observing every sampling unit within controlled environments. Ritchie et al. (2013) argued that there are certain studies involving large populations that would require large labour force, high cost, and more time. Therefore, sampling techniques help to select and analyse a small number of individuals, events, or items, from the population as a whole and to find the characteristics of the chosen population. The sampling techniques reduce costs, save energy and time, allow finding the greater scope, and provide results with improved accuracy and precision (Ritchie et al., 2013). There are two types of sampling techniques: probability and non-probability sampling techniques.

The present study utilised a cluster sampling technique, which is a method that falls under the category of probability sampling. Cluster sampling is a method that involves dividing the population into separate groups or clusters and then using random sampling to select clusters for analysis (Sedgwick, 2014). This method guarantees a wide range of representations by randomly choosing groups from the total population, which consists of 233 students from both the universities and 15 educators and 4 IT staff.

Cluster sampling is especially beneficial for dealing with the intricacies of varying institutional or geographical features within the population. By prioritising clusters, this approach effectively encompasses a diverse set of variables and conditions found within various clusters,

thereby improving the sample's representativeness. As a result, it enhances the external validity of the research, enabling more extensive generalisation of the findings (Sedgwick, 2014).

This methodology is suitable for the present investigation as it guarantees the inclusion of students and teachers from different departments and campuses, thereby offering a comprehensive assessment of the educational application of AI at Coventry University (CU) and the University of Wales Trinity St David (UWTSD). This technique guarantees a diverse and varied inclusion of samples by clustering the population and randomly select sample clusters. Unlike other sampling techniques, this technique addresses complexities such as differences in institution or geographical characteristics of the population. The study is enhanced by the inclusion of a significant number of students and teachers, which allows for a well-rounded perspective that encompasses the experiences and opinions of both crucial participants in the educational process.

To summarise, the present study utilised a cluster sampling technique, which is a method of probability sampling, in order to obtain a sample of 233 students and 15 teachers that is both diverse and representative. In addition to it, the researcher has also collected from 4 IT professionals (2 from CUL and 2 from UWTSD). The Cluster sampling is a method that involves dividing the population into separate groups or clusters and then using random sampling to select clusters for analysis (Sedgwick, 2014). This approach is well-suited for the research objectives, which seek to assess the incorporation and influence of AI in educational practices at CUL and the UWTSD. The study aims to assess the status and incorporation of AI tools in pedagogy at CU and UWTSD. The use of cluster sampling is advantageous as it guarantees the inclusion of a diverse sample of students and teachers from various departments and campuses. This diversity offers a comprehensive survey of the current utilisation of AI in both institutions.

The current study recruited a total of 233 participants, including 126 students from CU and 107 from UWTSD. The semi structured interview was conducted. Total 15 educators and 4 IT staffs have participated in the interview. 9 educators from CU, as well as 6 educators from UWTSD. Out of 9 educators from CU, 4 were lecturers, two were course leaders, one was an academic director, and two were module leaders. Out of 6 educators from UWTSD, 4 were

lecturers, two were program leads. This allocation guarantees that both institutions are sufficiently represented, enabling a balanced and thorough analysis.

3.7: Stakeholders' analysis

3.7.1: Operationalisation of stakeholder's analysis

Stakeholders are groups or individuals who have a direct or indirect interest or concern in a project, organisation or system (Bell et al, 2022). These stakeholders can be affected by the company or organisation's actions, policies or objectives. There are a number of common stakeholders in business including customers, employees, shareholders, communities, suppliers, and government.

3.7.2: Stakeholders in Higher education

In the higher education sector, stakeholders are groups or individuals who have a keen interest in the higher educations' operations, system, governance and outcomes. These stakeholders are including, student, academic and administrative Staff, IT staffs, parents and guardians, government, employers, communities, societies, accreditation and professional Bodies, regulators bodies.

Students: They are the primary beneficiaries of the education system. Their main aim is to receive high-quality education, positive learning enviornment and reasonable/affordable tuition fees (Jongbloed et al, 2008).

Academic Staff: they are including tutors, lecturers, professors, coach and mentors are the internal stakeholder focus on teaching, learning and research (Freudenreich et al, 2020).

IT staff: they are the internal stakeholders who focus on technologies implementation throughout the teaching, administration and learning process.

Table 3.1: Details of Stakeholders Group

Stakeholders Group	No. of People Interviewed
Academic staffs	15 1 Academic director (CUL) 2 course leaders (CUL) 2 program leaders (UWTSD) 6 lecturers (CUL) 4 Lectures (UWTSD)
IT staff	4
Student	233 (126 from CUL and 107 from UWTSD)

(Source: created by the researcher, 2025)

The main purpose of the selecting participants was to accomplish relevant cross-section of participants. The researcher has interviewed 15 academic staff including 1 Academic director (CUL), 2 course leaders (CUL), 2 program leaders (UWTSD), 6 lecturers (CUL), 4 Lectures (UWTSD). 4 IT staffs have been interviewed, 2 of them CUL and 2 of them UWTSD. The interview of each participant has been arranged after all the protocols such as participants consent form was followed. On the other hand, over 300 questionnaire was distributed amongst both the universities' students, however, only 233 students' questionnaire were collected, 126 from the CUL and 107 from the UWTSD London Campus.

Table 3.2: Details of organisation's participation

Stakeholders Groups	People/organisations visited
Academic	Coventry University (three campuses in London) UWTSD in London
IT (2 from CUL and 2 from UWTSD)	Coventry University (three campuses in London) UWTSD in London
Students	Coventry University (Three campuses in London) UWTSD in London

3.8: Designing semi structured interview and questionnaires

The design of questionnaires has been the crucial phase in the study process that shapes the data collection methods and its effectiveness. In this, a set of questions that are unbiased, clear and able to draw insightful answers from participants. The questionnaires should be designed in a way that maintains balance between openness and specificity for obtaining the multiple viewpoints of participants. The current study adopted two questionnaires: one for students (close-end survey questionnaire) and one for academics (open-ended semi structured interview).

Since this study was concerned with human subjects and their thoughts, feelings, and experiences in relation to the research themes, a survey research strategy seemed to be the most appropriate approach (Alreck & Settle, 2004). Survey research also provides models of interactions between variables and explains why they exist in the first place (Saunders et al., 2009).

Choosing the right set of questions has become essential to conducting interviews, particularly semi structured interviews, as it facilitates communication and let participants to be more honest when providing answers. 18 semi-structured interview questions were designed in this study to ask academics about the appropriateness and extent of AI in HEIs. The participants

who were interviewed received a consent form and an information sheet before the interview started, and a protocol form was also made for the research. This form has a short description of the research and clear directions for how to collect comparable qualitative data (Ritchie et al., 2013). In semi structured interviews, initial questions are more general in the beginning in order to motivate interviewees to comfortably share their experiences; and the interview progresses, it was more focused. If interviewer requires more details about any information, follow-up questions can be asked. Another set of questionnaires, which contained 18 open-ended questions was provided to the students to gain insights into their knowledge and expertise of AI applications in HEIs. A Likert 5-scale measurement tool (5 = Strongly agree; 4 = Agree; 3 = Neither agree nor disagree; 2 = Disagree; 1 = Strongly disagree) was used to record the answers of close-ended questionnaires.

The student questionnaires were provided to the respondents through email as well as provided QR code in the class which was very convenient for the students for participants. The purpose of the study was clearly stated to them, and they were asked to be involved in the study of their own. There were timely reminders (like follow-up emails) to improve the response rate of the questionnaires. If there are any questionnaires with missing or unclear data, the researcher addressed this issue by means of follow-up email communication to participants. The semi-structured interviews with academics were scheduled according to the convenience of the interviewees. Moreover, the interviews were recorded digitally (on Team) to ensure the accuracy of the interview data. However, a few of the interviewees have answered the questions by writing, including IT interviewees. Moreover, the participants also confirmed that they could withdraw from the interview at any time.

3.9: Data collection methods

As was mentioned in the previous section, this study used a mixed-method research approach for data collection. Primary data was the data source for this study. According to Kemper et al. (2003), a simultaneous mixed-method approach involves the sequential gathering and analysis of two categories of data: quantitative and qualitative, both of which are done concurrently. This approach

is described as using mixed data (text and numerical) and alternate tools (analysis and statistics) while adhering to the same methodology (Bazeley, 2018). This kind of research employs a quantitative study paradigm during one stage and a qualitative study paxradigm during another.

According to Burke and Krey (2005), mixed-method studies are a logical addition to employing either the conventional quantitative or qualitative research approaches alone. The authors define it as the category of research in which the investigator integrates or incorporates methodologies, principles, language, techniques, and strategies from both quantitative and qualitative studies in one study. From a philosophical standpoint, mixed-methods study is a third wave, or third research movement, which offers a reasonable and useful alternative to paradigm conflicts (Burke & Krey, 2005).

According to Creswell et al. (2004), mixed-method studies entail integrating, relating, or combining data at some point during the study process rather than just gathering both quantitative and qualitative data. They also show that the fundamental reasoning behind mixing is that trends and characteristics of the situation cannot be fully captured by either quantitative or qualitative approaches alone. Together, both quantitative and qualitative information provide a more thorough study and enhance one another. In an attempt to make the same case for the rationale of mixed-method research, Johnson and Onwuegbuzi (2004) stated that abduction, which is the process of identifying and relying upon the most plausible explanation for one's findings, deduction, which entails testing hypotheses and theories, and induction, which is the process of finding patterns.

There are various arguments for the combination of qualitative and quantitative research approaches. Sale et al. (2002) offers the following observations regarding the integration of the two techniques:

"Recognising the world we live in is the common goal of both techniques, therefore they can be merged. Each follows the same rules of inference, and they both follow the same unified logic. By combining the two methods, it is possible to examine a given occurrence from a number of viewpoints regarding to get a deeper understanding of the existing methods, difficulties, and

potential advantages related to pedagogical interventions powered by artificial intelligence (AI) in HEI's. They also have the common objective of promoting knowledge for real-world application and a shared dedication to bettering humankind. These methodologies facilitate triangulation or cross-validation, which involves merging two or more theories or data sources to investigate a single phenomenon in order to obtain a more comprehensive understanding of it (interdependence of research methods). Additionally, they enable the attainment of alternative outcomes by leveraging the advantages of one technique to strengthen the other (method independence)" (*Sale et al., 2002, p112).*

Onwuegbuzie and Leech (2006) provided evidence to support the above observation by pointing out the following justifications for combining quantitative and qualitative methods: significance enhancement, treatment integrity, instrument fidelity, and participant enrichment. Enhancing the researcher's analysis of the data is known as ***significance enhancement***. Treatment integrity refers to combining quantitative and qualitative research approaches when evaluating the fidelity of interventions, procedures, or activities. Optimising the suitability and/or usefulness of the instruments employed in the research is referred to as ***instrument fidelity***. Adding more people to the study is referred to as ***participant enrichment***. Research findings are more likely to be valid and dependable when the sample size is higher (Onwuegbuzie & Leech, 2006).

The stages involved in carrying out a mixed methods study are depicted in the figure below (figure 3.2).

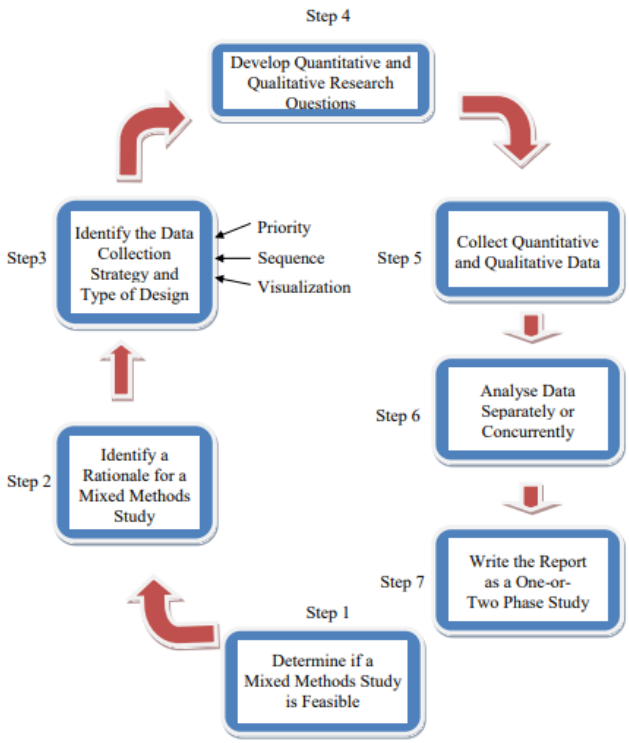


Figure 3.3: Steps in the process of conducting mixed method research *(Source: Mafuwane, 2011)*

Determine if a Mixed Methods Study is Feasible: This step involves assessing whether the research question or problem can benefit from both qualitative and quantitative approaches. Researchers evaluate if the combination of both methods will provide a more comprehensive understanding of the issue being studied.

Identify a Rationale for a Mixed Methods Study: The researcher establishes the reasons for choosing a mixed methods approach. This could include the need to corroborate findings, provide a more complete picture of the research problem, or explain quantitative results with qualitative data.

Identify the Data Collection Strategy and Type of Design: In this step, researchers decide on the specific mixed methods design to be used, such as convergent, explanatory, or exploratory. They also figure out how data will be collected, whether sequentially or concurrently.

Develop Qualitative and Quantitative Research Questions: Researchers formulate specific questions for both the qualitative and quantitative components of the study. These questions guide the data collection and analysis processes, ensuring that both aspects of the study are aligned with the research objectives.

Collect Qualitative and Quantitative Data: Data collection involves gathering the necessary qualitative data (e.g., interviews, observations) and quantitative data (e.g., surveys, experiments). The timing and sequence of data collection depend on the chosen mixed methods design.

Analyse Data Separately or Concurrently: Researchers analyse the qualitative and quantitative data either separately or concurrently. The choice of analysis method is influenced by the research design and the nature of the data collected.

Write the Report as a One-or-Two Phase Study: The final step involves writing the research report. Depending on the research design, the report may be structured as a one-phase or two-phase study, integrating the qualitative and quantitative findings to provide a comprehensive answer to the research questions (Mafuwane, 2011).

From the research study's design phase to its data analysis phase, the seven steps shown in the above figure were followed. As illustrated in figure 2, the author used various approaches to research in this study as complementary modes of investigation, leading to a greater comprehension of the phenomenon being studied, rather than seeing them as parts of an incompatible qualitative/quantitative dichotomy (Herman & Egri, 2002).

3.9: Data Analysis techniques

Different types of analysis can be used to look at qualitative data, such as Interpretative phenomenological analysis (IPA), discourse analysis, grounded theory, and theme analysis. Thematic analysis is a qualitative method to allow the researcher to identify, assess and interpret the collected data (Braun and Clarke, 2006). One of the advantages of this analysis is a flexible approach in various disciplines to investigate uncovering themes which are addressing the research

questions. Thematic analysis was used to look at the answers to the semi structure interview questions in this study. The goal of a thematic analysis is to find trends in data, analyse them, and report on them (Braun & Clarke, 2006). The goal of thematic analysis, like all other qualitative analysis methods, is to give a full, complicated, and rich picture of any set of data. In this way, the researcher can get a better sense of the thing they are studying. This method worked well for both practical and theoretical reasons when looking at the ongoing study into the roles and perceptions of the various stakeholders including educators and IT personnel.

Thematic analysis is thought to be more theoretically flexible than the qualitative methods that have been talked about so far. Braun and Clarke (2006) suggested a set of guidelines for good thematic analysis that made it clear how themes should be found and categorised. As a result, the actual analysis was done in a series of steps that were all connected to each other. These steps included getting to know the data set, making initial codes, looking for themes, going over found themes again, and defining and naming themes. According to the writers, a researcher must be aware of all the data in a dataset before they can find patterns of meaning. This can only be done by reading the dataset over and over again. This way of analysing gives you options as a researcher, and in the end, it can give you a full, complicated, and rich story about the dataset. Thinking that themes just appear or are found is an inactive way to look at the analysis process; it does not show how active the researcher is in finding patterns or themes, choosing the most interesting ones, and telling readers about them (Taylor & Medina, 2011). There are different ideas about what the theme is and how it appears, so the researcher has to use their own judgement to figure out what the theme is. This is why they need to be flexible; strict rules will not work. It is not so much how strong a theme is that can be measured, but whether it captures something important about the study question as a whole (Braun & Clarke, 2006).

The current study adopted a thematic analysis method for analysing the data collected. Thematic analysis has been the best choice since it presents a strong and open analysis of the feedback and opinions of the participants. Another benefit of employing this method is that it serves as an increasingly beneficial analysis method particularly for researchers and students at

their initial learning time regarding the subject matter of the study; also, it gradually helps researchers who are expertise in quantitative or qualitative methodologies to learn more about the subject matter of the study (Braun & Clarke, 2006). Braun and Clarke (2006) defined guidelines for conducting the thematic analysis and included six steps, as shown in figure 3.3. These guidelines were used in the current study.

Figure 4.3: Six step approach to thematic analysis *(Source: Braun & Clarke, 2006)*

Step 1: Familiarisation with the data

In the first step, data collected for the study needs to be transcribed to gain basic knowledge

on the data provided by the participants through survey or interviews. This familiarity with the data will help the researcher identify possible themes (Braun & Clarke, 2006). The current study transcribed the semi structured interview data to understand and organise it. The digitally recorded interviews were also used in transcription to ensure the accuracy of the interview data. According to Braun and Clarke (2006), the data must be transcribed in a manner that it is true to its actuality.

Step 2: Generate initial codes.

The transcribed data were then saved in the MS Excel file with different columns that served different purposes; for example, the interviewer question in one column, participants answer in another column, initial codes identified from the second column, etc., The current study manually coded for the transcribed data that aligned with the research purpose of the study. This is known as open coding, as defined by Maguire and Delahunt (2017) that no predetermined codes are present in the initial stage of the study and as the study progresses, the coding will be formulated.

Certain codes were identified in this stage like 'the necessity of AI learning by students.' This was formed based on the data provided by the academician(s) where they expect the students to gain experience and knowledge what they possess. The academicians believed that the use of AI in education can help students to quickly learn the study concepts. 'Knowledge gaps of students' were another code found. With this, academics believe AI applications can provide students with determining and analysing concepts when there exists a knowledge gap between what is taught and what is understood. Some of the other codes identified include self-evaluation of students', use of chatbots in education' from the response of the close-ended survey questionnaire.

Step 3: Search for themes

According to Braun and Clarke (2006), theme can be used to capture data with regards to the research question(s) of the study and provide meaningful insights into it by identifying certain patterns. No predetermined rules were there to search themes and if any themes identified have

been based on the significance of the study. Maguire and Delahunt (2017) argued that there has been possibility for overlapping the themes, as the study progresses. With all these definitions, the current study was identified themes by grouping the generated codes aligned with the research questions of the study. The themes were presented in different sheets of the MS Excel file where a theme was formed by gathering the codes and some codes were linked with multiple themes. For example, a code 'uncertainties in interview answers' were related to themes like 'AIED effectiveness' and 'satisfaction of AI learning'. Initial thematic map was used to examine the codes with its respective themes. This mapping might help research in subsequent phases to ensure extensive data analysis as the study takes a longer period of time to complete.

Step 4: Review themes

The identified themes need to be reviewed to examine their weightage. If a theme has provided with insufficient data, the study cannot provide support to the findings for that theme. For this, the themes identified were reviewed again in order to check any coherence between the codes and their identified themes. Any modification on the themes or generating new themes are done in this step (Braun and Clarke, 2006).

Step 5: Define and name themes

Braun and Clarke (2006) argued that after identifying and reviewing the themes, it is essential for a researcher to explain the interesting facts about the data from the themes and the reasons for it. The current study defined the themes for the collected data from CU and UWTSD institutions to investigate the appropriateness and extent of AI. Braun and Clarke (2006) recommended giving unique names to each theme. The names should denote the characteristics of that particular theme. The current study provided unique names to all the themes identified.

Step 6: Produce report

The last step in this data analysis process is to prepare the reports for the identified, reviewed, and defined themes to ensure the validity and reliability of the data (Braun & Clarke,

2006). The themes should be written and explained in a way that readers can understand easily. The reports should contain not only the themes' definition but also explain how the methodical findings are in relation to the study endeavour (Braun & Clarke, 2006). The next chapter details the themes and sub-themes identified from data analysis.

3.10: Coding the data

While raw data can be intriguing, it does not provide the reader with a meaningful understanding of the social world being studied or the participants' experiences unless it has been carefully analyzed to reveal underlying patterns and insights. Coding or putting data into groups is an integral part of research. It involves dividing the data into smaller pieces and putting them into groups (Devi et al, 2022; Basit, 2003). Codes or categories are names or tags that are used to give descriptive or inferential information gathered during a study meaning units. Codes are usually linked to groups of words, phrases, sentences, or even whole paragraphs that may or may not have anything to do with the setting.

According to Kelle (1995), coding is the process of noticing things that are linked, gathering examples of those things, and then analysing them to find patterns, structures, and things that are the same or different (Basit, 2003). Through the creation of categories, a conceptual framework is built that works with the facts. The scheme helps the researcher come up with questions, compare different sets of data, add or remove groups, and put them in a different order. Some researchers have shown that it might be helpful to divide data coding into two separate but related steps. The first step is to focus on what the data means for the research itself, and the second step is to think about what it might mean to people outside of the research (Bell et al, 2022; Basit, 2003).

Coding and analysing data are not the same; coding is an integral part of the analysis. Qualitative data analysis is not a one-time thing that happens at the end of a research study; it goes on through the project. Even if the researcher does not do a thorough analysis of the data at the start of the study, he or she still needs to think about how to make sense of it and what codes, categories, or themes could be used to explain what's going on.

Coding in NVivo is open and easy to understand. The researcher could always code and uncode text or information, take a code off of a node in the list of nodes, change the name of a node, move from one tree to another, and sometimes become a child node of another node, and so on. The researcher used a deductive approach to create the nodes. Some categories had to be decided ahead of time, so some nodes were made and then the documents were coded directly in NVivo. This method can be used when the researcher doesn't want to read through the transcripts carefully first (Basit, 2003).

Since qualitative data are text-based, not numerical, and not organised, coding is a very important part of the analysis to organise and make sense of them. Studies have talked about the idea of coding in terms of reducing data, distilling it, grouping it, and classifying it. Coding's main job is to let the researcher talk to and connect with all the data they've collected, to make it easier to understand new phenomena and, in some cases, to come up with a theory based on the data (Basit, 2003).

The initial categorisation took a long time, even though only three people's data had to be coded. This was because the talks were long, and all three managers gave a lot of information. Also, Bruk and Krey (2005) said that the first steps are slow and uncertain. As the researcher went through the process of putting the data into nodes, choices became more certain and in line with what was known about each category. Any confusion was cleared up, which made the data less surprising and strange. Many times, faster and more efficiently can the data be categorised when NVivo is used. If experts use this software for just a few interviews, they can play around with data and get to know it well enough to be able to code with confidence. The categories that came up were changed and put in the same seed ideas of the framework that was being looked at for the study.

3.11: Time Horizon

According to Saunders et al. (2009), time horizon is defined as a period of research being conducted. This has been related to data collection and can be broadly classified into two types: longitudinal and cross-sectional. If the study has been conducted and collects data for different

intervals of time with same samples, it is called as longitudinal study. The same, if conducted within a specific period of time, it is cross-sectional study (Saunders et al., 2009).

3.11.1: Cross Sectional

Cross-sectional (or transverse) research denotes the study carried out in a particular period (Saunders et al., 2009). For example, academic studies are carried out in a particular period of time i.e., the duration of these studies has been predetermined and needs to be completed in that time. In general, researchers, if they need to examine the relationship levels between dependent and independent variables for a specific period of time employ cross-sectional regression study. Mainly, these studies adopt quantitative methodologies and survey as their data collection tool. However, in some cases, qualitative or mixed-methodology studies also adopt this cross-sectional timeframe. For example, interviews are conducted within a short term (Saunders et al., 2009).

3.11.2: Longitudinal

According to Bell et al. (2022), longitudinal research offers greater scope to examine developments and changes over the same phenomena (population) for different periods of time. It is also known as observational studies. These types of studies are mostly applicable in social personality and clinical psychology areas where the sudden changes in humans' thoughts, emotions, and behaviours have been studied for different periods of time. Studying different trends among consumers in consumer-related studies and changing events between different generations in sociology studies are other examples of longitudinal studies (Saunders et al., 2009).

Both cross-sectional and longitudinal studies differ to each other. Cross-sectional studies compare the identical characteristics of two unidentical individuals; where longitudinal studies focus on the similar objects over a longer period and identify and examine the developments and changes to provide outcomes to a greater extent (Saunders et al., 2009).

3.11.3: Time Horizon of the project

In a research project, the most crucial component while making the plans for the research is time horizon, as argued by Saunders et al. (2009) and Bell et al. (2022). The current study adopted cross-sectional design as the purpose of this study was to examine particular phenomenon within a specified period of time.

3.11.4: Triangulation

According to Turner and Turner (2009), using at least two data collection techniques for studying the specific phenomenon has been defined as triangulation. Chidom's finding (2012) was extended by Jacobs et al. (2017) and argued that issues have been often seen from single-theory, single observer, and single-method studies that produce intrinsic biases and limitations; this has been greatly controlled if the study adopts multiple empirical materials, methods, theories, and observers. Combining multiple perspectives helps in obtaining and verifying the study' findings that serves the purpose of triangulation (Jacobs et al., 2017).

Most studies often look for the point to combine different and multiple data sources for identifying categories or framing themes where the triangulation acts as validating technique (Natow, 2020). The overlapping areas are eliminated, and data are sorted in order for finding the common categories or themes. The current study employed triangulation method where the 300 students of CU and UWTSD institutions were chosen to fill the close-ended questionnaires and 20 academics for the semi structured interviews. However, 233 participants participated in the close ended questionnaire survey and total 16 participants participated in the semi structured itnerview. The three data sources are noted at each point of the triangle, where philosophical starting points are offered by one data source to another. The following figure (figure 4.4) show this representation:

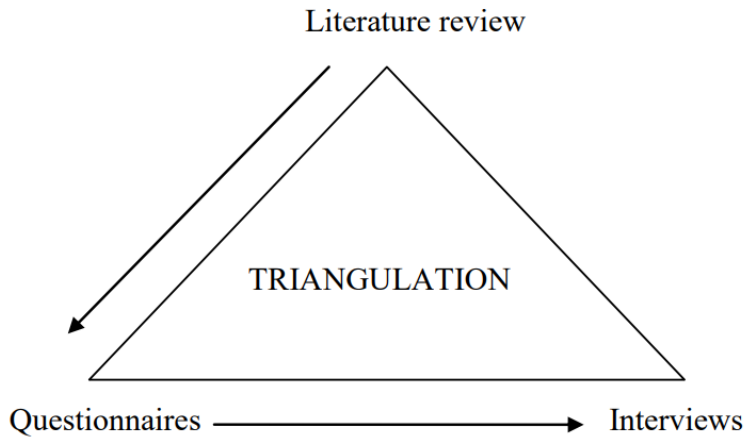


Figure 3.4: Data source triangulation representation *(Source: Marouni, 2019)*

From figure 4, it was identified that the current study was used three different sources of data such as interviews, questionnaires, and literature review. The secondary data for the current study was obtained from a literature review that also helped in formulating questionnaires for the current study. Both questionnaires for students (close-ended) and semi structured interviews (open-ended) were framed from this data source. According to Denzin, cited in Decrop (1999), there were four triangulation types. Out of these, methodological and data triangulation are the only triangulation types that were adopted by the researcher.

Methodological triangulation is the technique that employs both quantitative and qualitative methodologies in one study whereas the data triangulation employs different sources of data in the study (Flick, 2018). The current study conducted literature reviews, questionnaires, and interviews (data triangulation) and adopted both quantitative and qualitative methodologies (methodological triangulation).

There exist various advantages that have been provided by triangulation. Triangulation offered more detailed insights to this study where literature review alone cannot be provided. Triangulation diminished the data insufficiency issue by employing multiple sources of data that verified and complemented each other (Flick, 2018). Moreover, holistic and beneficial insights were offered to the study by gathering information from multiple sources, particularly direct

interviews with university academics, where real and first-hand experiences were obtained.

3.12: Data management

Secure and efficient data management ensured the reliability and integrity of the current study. Below are the steps that were followed throughout the study for managing, storing, securing, and backing up the data.

Coherence and accessibility were ensured for the systematic organisation of both qualitative and quantitative data. Microsoft Excel was used to create a structured database for quantitative data. Unique sheets were created for differentiating different information; for example, one sheet for storing demographic details of the participants, one sheet for recording the responses obtained from the questionnaire, etc., The quantitative findings were recorded in organised and methodological ways since seamless retrieval and analysis of data are offered by the Excel database. The in-depth semi structured interview, served as qualitative data, were interpreted and saved digitally. Based on themes and participants, the data systematically were separated and stored in folders protected with passwords. Such process helped the current study to analyse qualitatively and ensured the validity and reliability of the interpreted data. Google Drive, a cloud-based platform, was also used for enhancing version control and collaboration. With this, all the documents had access in real-time, enhancing collective inputs and guaranteeing latest and synchronised study resource repository.

The most crucial step in a study is to protect the participant data. Only authorised personnel related to current study have provided access to repositories of primary data (both in Cloud and MS Excel applications Implementing password protection mechanisms on each data storage device ensured an extra security layer. Additionally, the current study carefully maintained the confidentiality of the participants. While in the process of data entry, anonymity was maintained for identifiable information. The individually identifiable information, if any, was saved securely apart from the primary dataset. This confirmed the anonymity of the participants. The concern over loss of data was removed by establishing strong and secure backup procedures. The Excel

application offers in-built automated backup system that provides extra safety for quantitative data. The researcher took regular backups every day that was ensured to preserve the last backup data in times of technical errors and/or accidental deletions of data. A hard disk was also used for external backup that provided additional safety to the study data. The hard disk was then stored in researchers' office location isolated from the main research site to safeguard against unexpected circumstances like hardware failure or data corruption. The current study also employed a three-layered backup technique including cloud storage, external drivers, and secure servers for ensuring the security of the qualitative data. These techniques supported the study to not worry about the data loss as multiple backup data were stored in different places. With all this, it has to be understood that the current study employed a redundant, secure, meticulous data management approach. Ultimately, the current study preserved data integrity and confidentiality and provided a strong basis for the whole study project by establishing comprehensive backup techniques and strong security mechanisms.

3.13: Validity and Reliability

Validity is a concept that concerns how accurately a test, process, or tool, such as a questionnaire, measures what it intends to measure. Punch (1998) defined validity as how well a measure represents the idea it claims to measure. In quantitative studies, validity can be either internal or external. External validity refers to the extent to which the results of a study can be generalised to different populations and settings, ensuring that the study settings are representative of the contexts where the results can be applied (Black, 1999).

Internal validity examines the underlying reasons for a study's results and helps eliminate other, less likely explanations for these outcomes. Internal validity can be assessed through content validity, criterion-related validity, and construct validity. Content validity, the most basic level of validity, concerns how relevant and representative the items are to the intended setting (Roberts et al., 2006). Criterion-related validity occurs when a tool (e.g., a questionnaire) can be compared to other tested tools that measure the same concept (Roberts et al., 2006). Construct validity refers to the initial thought, idea, question, or theory that guides data collection. This was used in the study

because the researcher formulated a hypothesis based on a theory aligned with the concept (Bryman & Bell, 2015).

In quantitative research, reliability refers to the degree to which a test, process, or tool like a questionnaire can produce similar or consistent results in different situations. For example, a reliability coefficient of 0.8 indicates that 80% of the variation in the true score is real, while 20% is due to error (Bond, 2004). Inter-rater reliability ensures that different people using the same study tool will obtain the same results, while test-retest reliability ensures consistency of results when the tool is used at different times. Reliability is significantly associated with the quality of field notes and the general accessibility of the study outcomes during the publication process (Silverman, 2017). The reliability of the study is determined by the number of measurement errors; the more errors, the less reliable the study is (Moss, 1994).

In qualitative research, validity and dependability are considered in terms of the trustworthiness, rigor, and quality of the research (Golafshani, 2003). To achieve these goals, the researcher must consider how to minimise bias and use triangulation to increase the likelihood that claims about social phenomena are true (Denzin, 1978). As a mixed-methodology approach was adopted in this study, the concepts of reliability and validity were carefully examined. Credibility, transferability, dependability, and trustworthiness were achieved for the qualitative data. Validity is a dynamic and multi-faceted concept in research, as it relates to the findings obtained from the study. Messick (1990) defined validity as the extent to which theoretical rationales and empirical justifications support the appropriateness and adequacy of findings and conclusions concerning assessment scores. However, Borsboom et al. (2004) argued that validity in examining factors can only be ensured if those factors are consistently present, and any changes in the factors are reflected in the findings.

The reliability of a study is its ability to produce consistent findings under stable conditions and to be used in other studies without leading to different outcomes. Reliability is the ability to remain consistent and repeatable over time. Maree and Eiselen (2004) examined the extent to which a similar study would yield the same results under similar circumstances, enabling reliable

comparisons for both practitioners and researchers. Reliability has been described as enhancing validity rather than opposing it (Maree & Eiselen, 2004). According to Sarmah and Hazarika (2012), reliability ensures consistent results over a long period and accurately represents the entire sample involved in the research.

The study's reliability and validity were further ensured by pre-testing the questionnaire. To improve the quality of data and responses, pretesting was conducted to ensure that the intended messages were correctly understood by the participants (Creswell et al, 2004). Three educators and 15 students who participated in semi-structured interviews and a questionnaire survey were involved in the pre-testing survey. After the pre-tests, some constructions were modified to make the questions clearer, though they had to be adapted to meet the research needs. Consequently, the reliability and validity of the study were supported through this test. Additionally, two experts from the Data Science and Artificial Intelligence course (one from CU, one from UWTSD) reviewed the questionnaires to ensure the reliability and validity of the data. The study employed triangulation to ensure reliability, validity, legitimate data, and to lend credibility to the study outcomes. Validity and reliability were once considered mutually exclusive research components, but Messick (1990) changed this view, describing them as mutually inclusive. Reliability is now seen as a category of validity, contributing to overall construct validity (Messick, 1990).

Finally, the researcher selected 233 respondents from those who completed the survey, conducted exploratory factor analysis, and performed a reliability test before analysing the entire study. The findings demonstrated that all theories were valid and met the minimum Cronbach's alpha value of 0.7.

3.14: Ethical consideration

Since Hammersley (1999) said that research is likely to have an effect on people's lives, either because they are involved in the research or because they are in a situation that is touched by the research, it was clear that this study was likely to have some impact due to this study as the findings will have some better understanding of AI tool in pedagogy.

Making sure there is a balance of power and power links came from the study's theoretical framework and setting. Researchers and subjects are socially positioned and tend to maintain the power structures of the groups they are a part of in their interactions (Robson, 2002). Examples of these relationships are researcher and subject, advisor and practitioners, and backer and supported. As we saw earlier, this study's researchers had a special bond with the people they were studying because they were there. It was important for the researchers and educators to think about their role and personality, as well as how they observe the AI tools being used in higher education to improve learning and teaching.

For a study to be conducted, informed consent, confidentiality, and obtaining other mandatory permissions, if any, are all important (Marshall & Rossman, 2014). Since the participants of this study were from multiple universities, the researcher obtained the approvals from the Ethical Committee from UWTSD. These institutions have a set of ethical guidelines when the study population includes human subjects that a researcher(s) must carefully follow while conducting their study. The researcher has not used CU name in the research instead used collaborative university which advised by the Ethical Committee.

Furthermore, the researcher obtained permission from both universities to conduct the study. In a research study, the following considerations should be ensured (Marshall & Rossman, 2014): (i) researchers are the sole responsible in maintaining the identities of the participants; (ii) only volunteered participants are involved in the study; and (iii) the study purpose has been clearly stated to the participants (Marshall & Rossman, 2014). Before commencing the study, an informed consent form was provided to the participants online and asked to complete it to ensure that they were involved in this study out of their own will. The study's purpose was also clearly mentioned in the consent form. The names of the participants were not disclosed and kept hidden for ensuring privacy and confidentiality. The interviews were also digitally recorded using smartphones after prior necessary permissions were acquired from the participants. In addition, the researcher used semi-structured interview questions using email. The researcher ensured that these recordings would not be used anywhere other than this study. The digital data were then saved in a computer

protected with strong password. The researcher also ensured that the data is stored only for 2 years as backup data if any unforeseen events happen. After that, these data will be deleted. Also, confidentiality was ensured for the transcribed and coded data using headphones. The appendices section at the end of this document included all the research questions and approvals obtained for the current study.

3.15: Limitations of the methodology

The current study has certain limitations. It has been essential to recognise and address these limitations for a better comprehension of the study endeavour and interpret the findings. Moreover, they should be addressed in order to enhance the credibility and transparency of the study. The first limitation identified was the limited access to collect questionnaire and semi structure interviews from the students and educators from UWTSD. The reason being that the researcher was a student at UWTSD and very challenging to approach students and educators and reluctant of participation despite putting all the effort into convincing them to participate. The number of educators has participated in the semi structure interview, but the researcher has expected more participation in the interview process. However, the researcher has got around 100 students' participation and educators from UWTSD.

The second limitation identified was the generalisability of the findings of the study. As this study focusses on only CU and UWTSD institutions, the extensive significance of the study findings to other higher education institutions were restricted. Due to the diverse demographics of students and the specific nature of CU and UWTSD universities, it was difficult to generalise the current study' findings to other institutions with different student populations or different administrative structures. Future studies may include a wider variety of institutions for enhancing external validity. Another limitation was related to the potential self-report bias in the questionnaires and interviews. The participants may have the chance to answer the questions in a manner to put themselves in a good light. There were implicit limitations despite careful designing of unbiassed questionnaires and keeping neutrality in semi-structured interviews. Future studies may apply different triangulation techniques to establish more detailed understanding of the

interview data. These limitations paved the way for future studies to carefully interpret the research methods, designs, and data collection instruments chosen.

3.16: Summary

This chapter aimed to investigate the appropriateness and extent of AI for pedagogic purposes, focusing on two universities, CU and UWTSD in UK. This chapter provides the justification behind the chosen research philosophy, approach, design, data collection and analysis methods. A mixed methodology was adopted to gain more insights into the subject matter of the study. Quantitative data was obtained from students; qualitative data were collected from academics. This had ensured a wider representation of the findings. The thematic data analysis technique was really helpful in understanding the data collected and interpreting it by forming themes and sub-themes. The validity and reliability of the findings were noted. Ethical considerations, including consent forms and data management techniques, were also discussed. Finally, the chapter ends with identifying the possible limitations and the recommendations for future studies to address it. The next chapter discusses the data analysis and findings in more detail.

Chapter Four: Findings

4.0: Introduction

The overall purpose of this chapter is to present the findings of the perspectives of students, academics and IT staff from CUL and UWTSD on appropriateness and extent of artificial intelligence for Pedagogic Purposes. This research emphasised the detailed outcomes from qualitative as well as quantitative analyses, seeking to assess the effect of AI combination on pedagogy practices within different higher education organisations. Therefore, this chapter explored the influence of artificial intelligence on essential academic variables, including digital literacy, learning outcomes, student engagement, academic performance, and creativity, as artificial intelligence stands as an important part of advanced educational practices. Therefore, such outcomes are developed to provide evidence-based perspectives that report to stakeholders, such as institutional leaders, policymakers, and educators, on how to support AI to promote the teaching and learning experience actively.

The findings were classified into two key sections such as qualitative data findings and quantitative data findings. Hence, the analysis of qualitative data facilitated insights from several qualitative information collected through visual analyses and interviews. This particular analysis investigates the insights of key stakeholders from UWTSD and CU on the AI implementation in the educational field, exploring the future directions, challenges, and strategies of AI application in enhancing student involvement and academic role. The quantitative data evaluates data gathered from a sample of a total of 233 participants across several educational institutions applying statistical techniques. The quantitative data findings involved non-parametric tests such as multivariate analysis, correlation analysis, Mann-Whitney U test, and normality tests to investigate the moderated and direct associations between educational outcomes and AI integration. Reliability analysis was conducted to identify the consistency of the findings (Saunders et al, 2009). Therefore, the combination of such analyses is intended to facilitate a holistic assessment of how AI technologies are encouraging educational outcomes and practices. In this chapter, the findings

discussed are designed to support the development of robust strategies for associating AI in higher education, increasing the positive effects on institutional performance and student learning, and addressing possible barriers.

4.1. Quantitative Data Findings

The research investigates the effect of AI association on several educational findings, such as digital literacy, learning outcomes, student engagement, academic performance, and creativity. Assessing the impact of artificial intelligence on students' performance and experiences is crucial for institutions, policymakers, and educators intending to harness its entire potential as it increasingly becomes essential equipment in educational settings. Therefore, the quantitative analysis is designed to facilitate perspectives into how AI associations fostered such educational factors and to what extent several moderating aspects, including perceived benefits and challenges, impact such associations.

At the same time, the research objectives supporting such analysis include: "assessing the relationship between key educational outcomes and AI integration," "evaluating the moderating effect of challenges and perceived benefits on the relationship between educational outcomes and AI integration," and "identifying significant differences in educational outcomes between different educational contexts, represented by different universities in this study." This research collected quantitative information from a sample of a total of 233 respondents across two educational organisations. Therefore, key metrics, including the test of Kolmogorov-Smirnov (K-S test), were incorporated to verify the data normality, and the test of non-parametric, such as the test of Mann-Whitney U, was implemented to evaluate diversity across several groups. Furthermore, correlation analysis was performed to determine the direction and strength of associations between educational outcomes and AI integration. Finally, multivariate analysis was assisted in ascertaining the entire influence of AI association on such variables and in examining the moderation impacts of benefits and challenges.

4.1.1. Descriptive Statistics

4.1.1.1. Demographic Characteristics

The demographic information of a total of 233 respondents responding to the research facilitates essential contextual perspectives, particularly in assessing how several factors lead to encourage outcomes and perceptions regarding AI integration in pedagogic practices at the UWTSD ("University of Wales Trinity St David") and CU ("Coventry University").

As shown in Table 4.1 the demographic characteristics of respondents in terms of gender, role, university of study, age distribution, and program of study level. Out of 233, 56.7% (132) respondents were identified as male, while 42.9% (100) were females, and 0.4% (1) respondents did not prefer to reveal their gender. When it comes to the distribution of age, 53.2% (124) respondents were coming under the age group of 18-24 years, 15.5% (36) were from 25-34 years, 15.5% (36) were from 35-44 years, 14.2% (33) were from 45-54 age group, and 1.7% (4) were from above 55 years.

In regarding the participants, 54.1% (126) belonged to Coventry University (CU) and 45.9% (107) were from University of Wales Trinity St David (UWTSD). 233 (all), (100%) respondents were students across both institutions. This finding clearly showed that CUL students were the majority of the participants in the survey due to the researcher is employed there.

In addition, 75.5% (176) students were undergraduates, 11.6% (27) were pursuing Master's degree, 8.2% (19) were PhD students, and 8.2% (19) were others.

Table 4.1: Demographic Characteristics of Participants

Demographics		Frequency (Percent)
Gender	Female	100 (42.9)
	Male	132 (56.7)
	Prefer Not to Say	1 (0.4)
Role	Student	233 (100)
University of Studying	CUL	126 (54.1)
	University of Wales Trinity Saint David (UWTSD)	107 (45.9)
Age	18-24	124 (53.2)
	25-34	36 (15.5)
	35-44	36 (15.5)
	45-54	33 (14.2)
	55 and above	4 (1.7)
Program of Study Level	Doctoral/PhD candidate	19 (8.2)
	Other	11 (4.7)
	Postgraduate (Master's degree)	27 (11.6)
	Undergraduate (Bachelor's degree)	176 (75.5)

(source: Created by the researcher, 2025)

4.1.1.2: Knowledge of AI in Higher Education, Challenges, and Benefits

The Table 4.2 below provides detailed insight into students' familiarity with AI-preferred learning modes, the tools they implement, potential benefits, perceived challenges, and participation in AI-based practices. It apparent that the majority (43.8%) of the total students were moderately familiar with AI, while an estimated 24.0% of the sample were very familiar with AI. On the other hand, 17.2% were slightly familiar, 8.2% were not familiar at all, and 6.9% were extremely familiar. It means, the majority of the participants were moderately familiar with artificial intelligence (AI) in the context of higher education.

On the contrary, the findings (Q.3.2) have clearly shown that the 2nd most identified tools was Moodle LMS (27.0%), 56 students recommended Canvas LMS (24.0%), and 64 students suggested Aula (27.5%); lesser-known equipment containing student engagement analytics, edtech apps, automated essay scoring, and adaptive learning platforms. Only 12 students (5.2%) selected Chatbots, one student (0.4%) chose automated essay scoring, one student (0.4%) selected the adaptive learning platforms, and one (0.4%) student considered peer review and collaboration as an effective tool. The overall findings of question 3.2 showed that the majority of the students were familiar with the Aula platform.

The finding of question 3.3 showed that students preferred mostly informal learning methods, with 37.3% (87) students learning AI concepts, followed by 28.3% (66) and 21.5% (50) students preferring formal courses and online tutorials, respectively. Moreover, 21.5% (50) considered online tutorials, 5.6% (13) chose self-study method based on books or textbooks, 4.7% (11) selected discussion groups, 1.3% (3) preferred massive open online courses, and the remaining 1.3% (3) were chosen peer learning to learn concepts relevant to AI technology. It means that the majority of the participants' informal learning methods to learn about AI concepts in higher education.

The findings of question 3.4 have clearly indicated that a majority of students (n=175; 75.1%) did not participate in extracurricular AI activities, while 58 (24.9%) reported involvement in these activities.

Table 4.2: Knowledge of AI in Higher Education, Challenges, and Benefits

Knowledge of AI in Higher Education, Challenges, and Benefits		**Frequency**	**Percent**
Familiarity with the Concept of Artificial Intelligence (Q.3.1)	Not Familiar at All	19	8.2
	Slightly Familiar	40	17.2
	Moderately Familiar	102	43.8
	Very Familiar	56	24.0
	Extremely Familiar	16	6.9
Familiarity with the AI Tools (Q.3.2)	Adaptive Learning Platforms	1	0.4
	Aula	64	27.5
	Automated Essay Scoring	1	0.4
	Chatbots	12	5.2
	EdTech Apps	1	0.4
	LMS platforms - Blackboard	16	6.9
	LMS platforms - Canvas	56	24.0
	LMS platforms - Moodle	63	27.0
	Other	9	3.9
	Peer Review and Collaboration Tools	1	0.4
	Plagiarism Detection Tools	3	1.3
	Speech Recognition and Language Learning	2	0.9
	Student Engagement Analytics	1	0.4
	Virtual Learning Assistants	3	1.3
	Discussion Groups	11	4.7

Preferred Mode of Learning about AI Concepts (Q.3.3)	Formal Courses	66	28.3
	Informal way	87	37.3
	MOOCs (Massive Open Online Courses)	3	1.3
	Online Tutorials	50	21.5
	Peer Learning	3	1.3
	Self-Study (Books or Textbooks)	13	5.6
Participation in Extracurricular Activities related to AI (Q.3.4)	Yes	58	24.9
	No	175	75.1
Perceived Challenges in Learning AI Concepts (5.1)	Lack of Resources	80	35.2
	Complexity of Concepts	93	41.0
	Lack of Time	80	35.2
	Difficulty in Finding Opportunities for Hands-on Experience	85	35.4
	Other	39	17.2
Anticipation of Challenges in the Integration of AI with Teaching and Learning (Q 5.3)	Concerns about Privacy and Data Security	124	52.2
	Bias in AI Algorithms	29	12.4
	Difficulty in Adapting to New Technologies	20	8.6
	Lack of Understanding or Training in AI Concepts	23	9.9
	Other	37	15.9
	Enhanced Personalisation of Learning Materials	102	43.8

Potential Benefits of AI in Enhancing Learning Experience (Q.6.1)	Improved Feedback and Assessment	54	23.2
	Access to Advanced Learning Resources	47	20.2
	Interactive Learning Experiences	9	3.9
	Other	21	9.0

(Source: Created by the researcher, 2025)

Looking at table 4.2 and question of 5.1, it is apparent that the majority of the respondents (41%), found the complexity of the concept of AI, followed by difficulty in finding opportunities for hands-on experience (37.45), lack of access to resources (35.2%), similarity lack of time 35.2% and finally other (17.2%). What is the strike of the findings are, the respondents have clearly indicated that complexity of AI concepts and lack of access to resources are the most important challenges perceived in learning more about AI concepts.

The table above illustrates (5.3) that the most commonly predicted challenges in AI integration were concerns about privacy and data security (52.2%), followed by bias in AI algorithms (12.4%), lack of understanding or training in concepts of AI (9.9%), difficulty in adapting the new technologies (8.6%), and others (15.9%). Consequently, the most common challenges are privacy and data security in the integration of AI technologies into teaching and learning.

Furthermore, as shown in table 4.2 (the last question), it has clearly indicated that the potential advantages of using AI concepts in improving learning experiences were included improved personalisation of learning materials (43.8%), improved feedback and assessment (23.2%), access to advanced learning resources (20.2%), interactive learning experiences (3.9%), and other applications (9%).

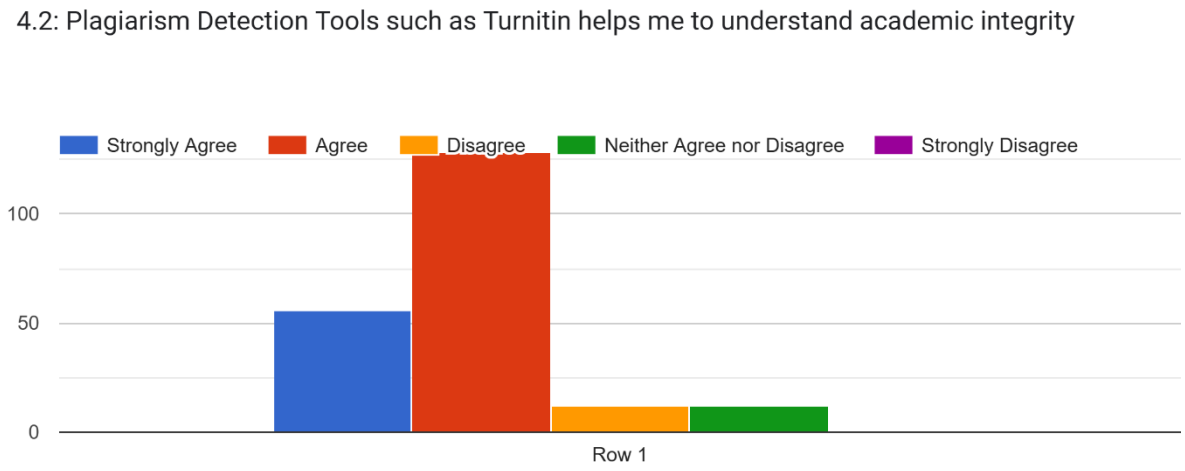
4.1.1.3: Significance and impact of artificial intelligence in Teaching and Learning

Figure 4.1: Significance and impact of AI tools

(Source: Created by the researcher, 2025)

It can be seen from the above figure 4.1 clearly indicated that the majority of the respondents (57.30%) agreed that the AI features in learning management system helped them to improve their learning experience, followed by a large proportion of the respondents (37.5%) disagreed with the statement. On the other hand, only 5.20% of the respondents neither agree nor disagree with the statement. This finding raises the question of why a considerable proportion of students did not find the AI features helpful, and what specific challenges or limitations they experienced when using these tools.

Figure 4.2: Plagiarism Detection Tools

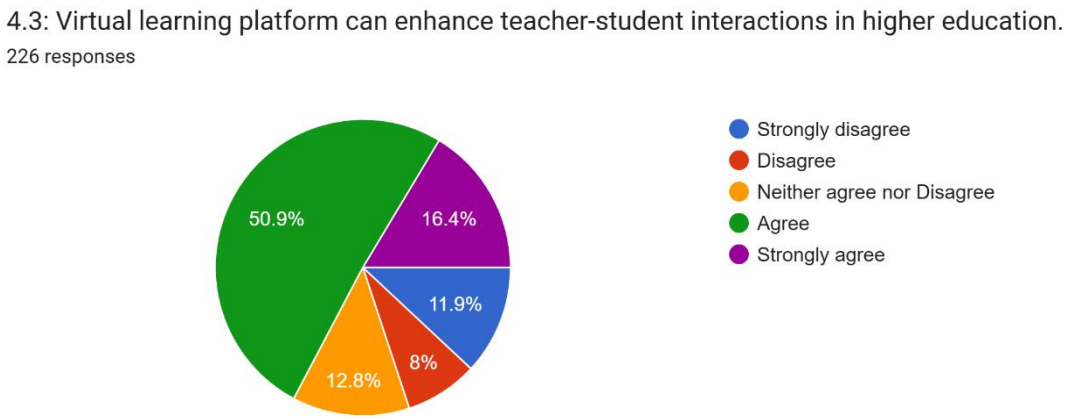


(Source: Created by the researcher, 2025)

The figure above shows that the substantial portion (184) students agreed that plagiarism Detection Tools such as Turnitin helps me to understand academic integrity. On the other hand, 12 students have not disagreed with the statement. The most important aspect of this result is that students

believe Turnitin supports their awareness of academic honesty and proper citation. Plagiarism detection was included in this study because it is one of the widely used AI-powered features in learning management systems. While it may not be the only AI function, it plays a crucial role in helping students develop good academic practices and avoid misconduct, which aligns with the study's aim to explore how AI tools can enhance learning experiences.

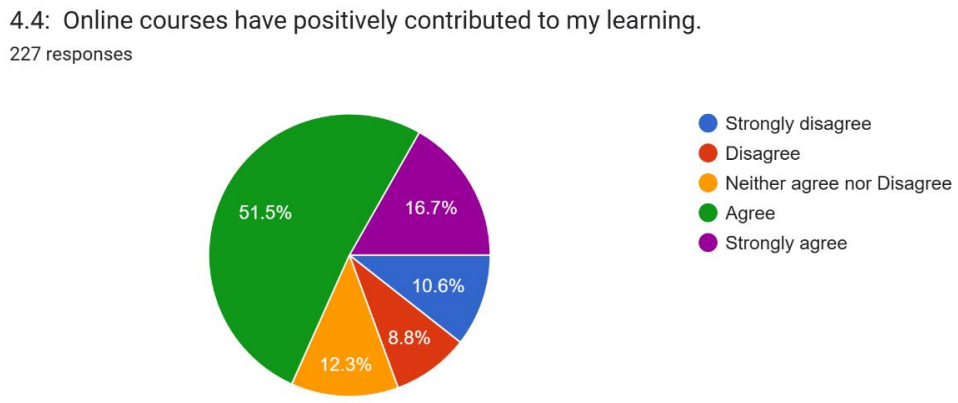
Figure 4.3: Virtual Learning



(Source: Created by the researcher, 2025)

From the graph above it can be seen that the majority (67.3%) of the respondents agreed that virtual learning platform can enhance teacher-student interactions in higher education. On the other hand, only 19.9% of respondents disagreed with the statement The results is significant as it shows clearly that virtual learning platforms can enhance teacher-student interactions in higher education.

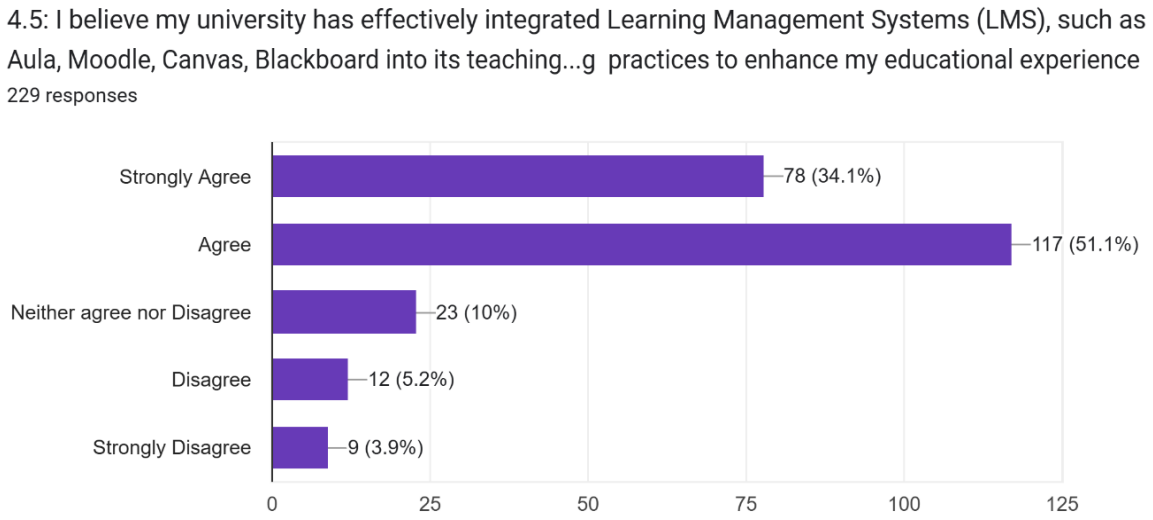
Figure 4.4: Online course positive contribution



(Source: Created by the researcher, 2025)

The above pie chart has shown that the majority of the respondents (67.2%) agreed that online courses have positively contributed to learning. However, on the other hand, only (19.6%) of the respondents disagreed with it.

Figure 4.5: integration of LSM



(Source: Created by the researcher, 2025)

As shown in figure 4.5 has indicated that over 50% of the respondents agreed that the university has effectively integrated Learning Management Systems (LMS), such as Aula, Moodle, Canvas, Blackboard into its teaching and learning practices to enhance their educational experience. However, on the other hand, 10% of the respondents disagreed with the statement. This finding raises the question of why a portion of students feel the LMS integration is not effective and what specific aspects of the systems or their implementation could be improved to better support students' learning needs.

4.1.1.4. Reliability Analysis

Table 3 presents descriptive statistics in terms of mean and standard deviation and reliability analysis of different variables based on Cronbach's alpha for different variables, such as AI integration, creativity, academic performance, student engagement, learning outcomes, digital literacy, challenges, and benefits. This analysis raises the question of whether the measured variables are consistently reliable and how strongly they contribute to understanding the impact of

AI tools on different aspects of students' learning experiences.

Table 4.3: Reliability Analysis

Variables	Mean	Standard Deviation	Cronbach's alpha
AI Integration	3.04	1.008	0.814
Creativity	1.82	0.951	0.792
Academic Performance	2.06	1.017	0.713
Student Engagement	3.54	1.217	0.735
Learning Outcomes	3.57	1.176	0.890
Digital Literacy	1.93	0.962	0.724
Challenges	2.1	0.935	0.912
Benefits	1.88	0.874	0.835

(Source: Created by the researcher, 2025)

It can be seen from the above that, participants exhibited moderate perceptions about AI integration (3.04) with moderate variability responses (1.008). Student engagement (3.54) and learning outcomes (3.57) showed good levels of responses that indicated positive perceptions with higher variabilities, such as 1.217 and 1.176, respectively.

Academic performance (2.06) and challenges (2.1) were considered average levels of responses, while digital literacy (1.93), creativity (1.82), and benefits (1.88) were perceived as low relatively. Learning outcomes (0.890), benefits (0.835), and challenges (0.912) showed excellent reliability that suggested highly consistent items. On the other hand, digital literacy (0.724), student engagement (0.735), academic performance (0.713), and creativity (0.792) exhibited acceptable reliability. However, student engagement and learning outcomes indicated differing perceptions since they showed the highest variability than the remaining variables.

4.1.1.5. Normality Analysis

In this research, the normality analysis result provided in Table 4.4 was developed by applying the K-S ("Kolmogorov-Smirnov") test for several statements based on AI association in the context of higher education. This test aimed to ascertain whether the data adhere to a normal distribution, which stands as a major assumption for diverse parametric statistical examination. However, for all the statements (including "benefits, challenges, digital literacy, learning outcomes, student engagement, academic performance, creativity, and AI integration"), the p-value was 0.000 (<0.05). Therefore, a significance level below 0.05 means that the particular data or information significantly diverges from a casual distribution for all the evaluated variables. Hence, the value of the K-S statistics starts from 0.234 to 0.348. Thus, the K-S statistics' higher value implies a larger changeability from normality. At the same time, academic performance reveals the highest changeability from normality, such as the statistic is 0.348, indicating that the responses of students about academic roles were highly non-normality distributed. AI challenges and integration revealed the lowest values of K-S statistics, 0.238 and 0.234, respectively, suggesting slightly lesser changeability from normality differentiated from the other variables. Still, they do not adhere to casual distribution.

Table 4.4: Normality Analysis

Statements	**Kolmogorov-Smirnov**		
	Statistic	**df**	**Sig.**
AI Integration	0.234	227	0.000
Creativity	0.304	227	0.000
Academic Performance	0.348	227	0.000
Student Engagement	0.334	227	0.000
Learning Outcomes	0.338	227	0.000
Digital Literacy	0.316	227	0.000
Challenges	0.238	227	0.000
Benefits	0.245	227	0.000

On the contrary, the outcomes suggest that each of the analysed variables does not follow a casual distribution, as demonstrated by the significance value of <0.05 for all the variables. This outcome implies that the data gathered on benefits, challenges, digital literacy, learning outcomes, student engagement, academic performance, creativity, and AI integration were not normally distributed among the students. Applying parametric tests (including "ANOVA and t-test") is not only appropriate for further examination since the normality statement was dishonored. The non-parametric statistical methods (such as the "Mann-Whitney U test") need to be acknowledged, as these tests do not need the normal distribution assumption.

Furthermore, techniques including data bootstrapping and transformation tend to be implemented to meet the non-normality in case the parametric tests were intended. However, the non-normal distribution was for different perceptions among participants about the areas of AI association and its effect on their respective education systems.

Therefore, factors such as varying exposure levels to AI equipment, different barriers faced by participants in learning, and diversities in academic performance regarding AI lead to participation in this deviation. In this analysis, it is also probable that extreme values (for example, participants who were either not familiar with the concepts of AI or extremely familiar with the concepts of AI) fostered the distribution, resulting in non-normality. Moreover, the normality analysis indicates that the data gathered on several statements about AI in the context of higher education do not follow the normal distribution.

4.1.2. Inferential Statistics

4.1.2.1. Test of Mann-Whitney

In the analysis, the Mann-Whitney U test's results, provided in Table 4.5, which was implemented to ascertain if any statistically significant differences were there between participants from upper mentioned two universities across five different dimensions (such as "digital literacy, learning outcomes, student engagement, academic performance, and creativity"). The creativity dimension indicated a higher p-value (0.730) and Mann-Whitney value was 6580, indicated no

statistically significant difference in creativity levels between two groups of students, such as UWTSD and CU. For the dimension "academic performance," the significance value is 0.000, and the Mann-Whitney U value was 4880.

In this particular finding, the p-value was <0.05, which suggested a statistically significant difference in specific academic roles between such two universities. The significance value was 0.454, and the "Mann-Whitney U Value" was 6384.5 for student engagement. However, the significance level was found to be >0.05, suggesting no statistically significant diversity in the context of student engagement between UWTSD and CU students. Furthermore, the significance value was 0.663 and the Mann-Whitney U value was 6534.5 for learning outcomes. Here, the significance value was >0.05, indicating no significant diversity in obtained learning outcomes between several students from such two diverse universities. Furthermore, for digital literacy, the significance level was 0.697, and the Mann-Whitney U Value was 6558.5. Therefore, the significance level suggests no statistically significant diversity in the levels of digital literacy between the UWTSD and CU students. These data findings revealed that academic performance only differed across students from two universities, such as UWTSD and CU, which showed disparities in this dimension.

On the other hand, no significant differences were observed for digital literacy, learning outcomes, student engagement, and creativity. It implied that these domains showed comparable competencies and experiences across both institutions, such as CU and UWTSD.

Table 4.5: Analysis of Significant Differences between CU and UWTSD for Creativity, Academic Performance, Student Engagement, Learning Outcomes, and Digital Literacy

	Creativity	**Academic Performance**	**Student Engagement**	**Learning Outcomes**	**Digital Literacy**
Mann-Whitney U	6580	4880	6384.5	6534.5	6558.5
Wilcoxon W	12358	10658	14385.5	14535.5	14559.5

S	-0.345	-4.019	-0.749	-0.436	-0.389
Asymp. Sig. (2-tailed)	0.730	0.000	0.454	0.663	0.697

(Source: Created by the researcher, 2025)

4.1.2.2. Correlation Analysis

Table 4.6 demonstrates the correlation between educational variables such as AI integration, creativity, academic performance, student engagement, learning outcomes, digital literacy, challenges, and benefits.

AI Integration: This variable has a Pearson coefficient value of 0.147 (p = 0.025) with learning outcomes, which indicates that both variables have a significant positive relationship, and hence, integrating AI tools can significantly improve learning outcomes. The 0.211 (p = 0.001) coefficient value with the benefits variable indicated a strong positive relationship between them, which means that increasing AI integration can significantly increase the benefits offered.

On the other hand, the negative relationship with the creativity variable findings (-0.192; p = 0.003) indicated that integration with AI technologies could lessen creative thinking opportunities. AI integration did not find a significant correlation with other variables, such as digital literacy, academic performance, digital literacy, and student engagement.

Creativity: Aa shown in table 4.6, This variable has a positive relationship with benefits (0.431; p = 0.000) and academic performance (0.246; p = 0.000) variables, both indicating that increasing creativity can lead to better-perceived benefits and academic performance, respectively. On the contrary, this study found that creativity variable has a negative relationship with student engagement (-0.179; p = 0.000) and learning outcomes (-0.206; p = 0.002) variables, which both demonstrated that increasing creativity can negatively affect learning outcomes and engagement with unconventional assessment or learning methods.

Academic Performance: Aa shown in table 4.6, this variable has a negative and significant relationship with learning outcomes (-0.260; p = 0.000) and student engagement (-0.269; p = 0.000) variables, both indicating that improving academic performance cannot offer enhanced learning outcomes or better student engagement. On the contrary, the findings have indicated that academic performance had a weak but positive and significant correlation with digital literacy (0.140; p = 0.033) and challenges (0.140; p = 0.032). Thus, these findings indicated that digital literacy, challenges, learning outcomes, and student engagement are associated with the academic performance of students.

Student Engagement: the findings shown in table 4.6, the variable has a positive relationship with the learning outcomes (0.457; p = 0.000) variable, demonstrating that increasing student engagement can produce better learning outcomes. On the contrary, the findings shown in table 4.6, the variable has no significant relationship with variables like digital literacy, AI integration, benefits or challenges. This finding means that student engagement can be impacted by factors directly associated with pedagogical practices compared to technical competencies.

Learning Outcomes: the findings shown in table 4.6, the variable has a weak and negative relationship with digital literacy (-0.186; p = 0.004) and challenges (-0.133; p = 0.042) variables, both indicating that since digital literacy depends on technology, it can negatively impact the direct learning outcomes. Moreover, the finding also showed that, since AI implementation does not come without challenges, it can also negatively impact the learning outcomes.

Digital Literacy: the findings shown in table 4.6, this variable has a moderate positive significant association with different variables including benefits (0.226; p = 0.001), challenges (0.166; p = 0.011), and creativity (0.403; p = 0.000). These relationships note that digital literacy can be improved by contributing to creativity, better academic results, and perceived benefits from AI usage. However, on the other hand, digital literacy has a negative relationship with learning outcomes (-0.186), which means that learning outcomes can be hindered if there is a knowledge or skill gap in digital literacy.

Challenges: the findings shown in table 4.6, this variable has a positive significant association with different variables, including creativity (0.266; p = 0.000), academic performance (0.140; p = 0.032), and benefits (0.504; p = 0.000). This determinant highlights the need to overcome challenges in order to offer better performance and more recognition of AI's benefits, suggesting a growth mindset.

Benefits: the findings shown in table 4.6, this variable has a strong positive relationship with challenges (0.504; p = 0.000), digital literacy (0.226; p = 0.001), and creativity (0.431; p = 0.000), indicating that AI educational benefits should be perceived as closely associated with digital literacy, creativity, and the ability to overcome challenges.

Table 4.6: Correlation between AI Integration, Creativity, Academic Performance, Student Engagement, Learning Outcomes, Digital Literacy, Challenges, and Benefits

Correlations	**AI Integration**	**Creativity**	**Academic Performance**	**Student Engagement**	**Learning Outcomes**	**Digital Literacy**	**Challenges**	**Benefits**
AI Integration	1.000	-0.192** (0.003)	-0.082 (0.211)	0.123 (0.060)	0.147* (0.025)	-0.067 (0.305)	-0.084 (0.199)	.211** (0.001)
Creativity	-0.192** (0.003)	1.000	0.246** (0.000)	-0.179** (0.006)	-0.206** (0.002)	0.403** (0.000)	0.266** (0.000)	0.431** (0.000)
Academic Performance	-0.082 (0.211)	0.246** (0.000)	1.000	-0.269** (0.000)	-0.260** (0.000)	0.140* (0.033)	0.140* (0.032)	0.166* (0.011)

Student Engagement	0.123 (0.060)	-0.179** (0.006)	-0.269** (0.000)	1.000	0.457** (0.000)	-0.033 (0.618)	-0.041 (0.538)	-0.079 (0.230)
Learning Outcomes	0.147* (0.025)	-0.206** (0.002)	-0.260** (0.000)	0.457** (0.000)	1.000	-0.186** (0.004)	-0.133* (0.042)	-0.094 (0.154)
Digital Literacy	-0.067 (0.305)	0.403** (0.000)	0.140* (0.033)	-0.033 (0.618)	-0.186** (0.004)	1.000	0.166* (0.011)	0.226** (0.001)
Challenges	-0.084 (0.199)	0.266** (0.000)	0.140* (0.032)	-0.041 (0.538)	-0.133* (0.042)	0.166* (0.011)	1.000	0.504** (0.000)
Benefits	-0.211** (0.001)	0.431** (0.000)	0.166* (0.011)	-0.079 (0.230)	-0.094 (0.154)	0.226** (0.001)	0.504** (0.000)	1.000

**Significant at 0.01 level; *Significant at 0.05 level

4.1.2.3. Multivariate Analysis

As shown in table 4.7 that the multivariate analysis findings explaining the relationship between an independent variable (AI integration) and the study's dependent variables (Creativity, Academic Performance, Student Engagement, Learning Outcomes, and Digital Literacy). The ANOVA method was employed for multivariate analysis, and p-values (Sig.), F-statistics, and R-square values were used to examine the effectiveness of the variables' relationships.

Creativity: this variable has an R-squared value of 0.041, indicating that AI integration can be explained through a 4.1 percent variance in creativity. Likewise, the variable has a p-value of

0.049 (significant at the 0.05 level) and an F-statistic value of 2.424, indicating that AI integration has a statistically significant but small effect. Overall, these high F-statistic and low R-squared values indicated that AI integration can either enhance or inhibit creativity.

Academic Performance: The variable has an R-squared value of 0.027, indicating that AI integration helps only 2.7 percent of the variance in academic performance. Similarly, the variable has a p-value of 0.187 (significant at the 0.05 level) and an F-statistic value of 1.556, indicating that AI integration does not have a statistically significant effect on these variables. This determinant means that AI integration does not have a direct impact on academic performance (test scores or grades).

Student Engagement: The variable has an R-squared value of 0.036, indicating that AI integration cab be explained through a 3.6 percent of the variance in student engagement. On the other hand, the p-value of 0.079 (0.05 threshold non-significant level) and the F-statistic value of 2.118 indicated that AI integration could negatively impact student engagement. However, there is not enough evidence to support this relationship.

Learning Outcomes: The R-squared value of 0.014 indicated that only 1.4 percent of the variance in learning outcomes could be attributed to integrating AI technologies. Moreover, the p-value of 0.520 and F-statistic value of 0.809 indicated that AI integration does not have a significant relationship with learning outcomes. This means that while AI has been incorporated into the learning processes, it is dependent on other mediating factors or has limited impact on measurable outcomes like skills development and knowledge retention.

Digital Literacy: The R-squared value of 0.015 indicated AI integration accounts for only 1.5 percent of the variance in digital literacy. The F-statistic value of 0.876 and non-significant p-value of 0.479 suggests that there is no significant impact between AI integration and digital literacy due to the fact that various factors can significantly influence digital literacy other than mere usage of AI tools (for instance, technological accessibility the level of education, and past experiences).

Other than the Creativity variable, no dependent variables have significant relationships with the independent variable of this study (AI integration). The dependent variables that have no significant relationship (i.e., Academic Performance, Student Engagement, Learning Outcomes, and Digital Literacy) with the independent variable demonstrated that integrating AI technologies alone is not sufficient enough to improve educational outcomes. These variables possess low R-squared values in the multivariate analysis, which shows other factors, such as student motivation, curriculum design, and teaching quality, can explain the variance values of these variables. Overall, not surprisingly, this study's multivariate analysis found that AI has a significant role in education, such as a positive impact on creativity.

Table 4.7: Relationship between AI Integration and Dependent Variables (Creativity, Academic Performance, Student Engagement, Learning Outcomes, and Digital Literacy)

	Sum of Squares	**R-squared**	**Mean Square**	**F**	**Sig.**
Creativity	8.558	0.041	2.140	2.424	0.049
Academic Performance	6.38	0.027	1.595	1.556	0.187
Student Engagement	12.321	0.036	3.080	2.118	0.079
Learning Outcomes	4.496	0.014	1.124	0.809	0.520
Digital Literacy	3.254	0.015	0.814	0.876	0.479

4.1.2.4. Moderation Analysis

In Table 4.8, the moderation effects of two factors, such as Challenges and Benefits, are explored between the independent variable (AI integration) and dependent variables (Creativity, Academic Performance, Student Engagement, Learning Outcomes, and Digital Literacy) of the study. This moderation analysis can explain whether the perceived benefits or challenges have a significant influence on the study's dependent variables through the integration of AI technologies.

Moderation by Challenges:

Creativity: as shown in table 4.8, the p-value of 0.003 and a Beta value of 0.188 indicated that challenges have a significant positive moderating effect between AI integration and creativity. This determinant means that when perceiving the challenges, AI integration can positively influence creativity and problem-solving.

Academic Performance: The p-value of 0.251 and a Beta value of 0.076 indicated that academic performance does not have a significant positive moderating effect with AI integration. This determinant means that when perceiving the challenges, AI integration does not have any impact on academic outcomes. However, it was found that other factors may have an important role in academic performance.

Student Engagement: The p-value of 0.878 and Beta value of -0.010 indicated no significant relationship that Challenges bring between AI integration and student engagement. In simple words, AI integration does not have a substantial influence on student engagement through Challenges.

Learning Outcomes: The p-value of 0.290 and Beta value of -0.070 indicated that there is no significant moderate effect of Challenges between AI integration and learning outcomes. This determinant means that challenges in AI integration have no role in learning outcomes.

Digital Literacy: The p-value of 0.060 and Beta value of 0.124 indicated that challenges might have a slightly positive moderating effect on the relationship between AI integration and digital literacy. This finding means that challenges in AI integration may slightly improve digital literacy skills; however, there are not enough studies to prove this statement.

Moderation by Benefits:

Creativity: The p-value (0.000) and Beta value of 0.369 indicated that perceived benefits could significantly impact the relationship between AI integration and creativity. This means that the perceived benefits of AI can lead to greater creative output.

Academic Performance: The p-value of 0.054 (marginally significant) and a Beta value of 0.129 indicated that perceived benefits could have a positive influence on the relationship between AI and academic performance. If AI benefits are perceived, educators and students can easily improve their learning abilities and skills, thus improving academic performance.

Student Engagement: The p-value of 0.952 and Beta value of 0.004 indicated that there is no significant moderation effect of benefits in the relationship between AI integration and student engagement. This finding also shows that other factors may determine student engagement, but these factors do not have a direct relationship with the perceived AI benefits.

Learning Outcomes: The p-value of 0.884 and Beta value of 0.010 indicated that perceived benefits have no significant impact on the relationship between AI integration and learning outcomes.

Digital Literacy: The Beta value of 0.150 and p-value of 0.026 indicated a significant positive moderation effect offered by perceived benefits regarding the increased impact of AI integration on digital literacy.

Table 4.8: Analysing Moderation Effects of Challenges and Benefits between AI Integration and Dependent Variables (Creativity, Academic Performance, Student Engagement, Learning Outcomes, and Digital Literacy)

Moderator	**Dependent Variables**	**Std. Error**	**Beta**	**t-statistic**	**F**	**Sig.**
Challenges	Creativity	0.065	0.188	2.957	23.215	0.003
	Academic Performance	0.071	0.076	1.15	3.14	0.251
	Student Engagement	0.086	-0.01	-0.154	1.726	0.878
	Learning Outcomes	0.083	-0.07	-1.06	1.519	0.29
	Digital Literacy	0.068	0.124	1.889	2.824	0.060
Benefits	Creativity	0.067	0.369	5.998	9.065	0.000
	Academic Performance	0.077	0.129	1.934	1.917	0.054
	Student Engagement	0.093	0.004	0.061	1.736	0.952
	Learning Outcomes	0.090	0.01	0.146	2.077	0.884
	Digital Literacy	0.073	0.150	2.248	2.080	0.026

(Source: Created by the researcher, 2025)

4.2. Interview Data Findings

This interview data finding section discusses how AI has been integrated into higher educational institutions, with reference to CU and UWTSD. Interviews and visual representations,

such as word clouds and tree maps, were used, highlighting the facets of AI and analytics, current practices in delivering education, student learning, and academic performance, including the challenges and benefits observed in these institutions. The researcher has interviewed 15 academic staff including an academic director, 4 course leaders, 3 subject leaders and 7 lecturers. 2 programs leaders from each university. 4 IT staff have been interviewed, 2 of them CUL and 2 of them UWTSD. Various themes have emerged, such as the use of AI-based educational tools, the importance of staff training, policy development, and the implications of AI on traditional learning environments. Future considerations of this study also address concerns for the systematic plan and direction as well as resource management potential to harness the benefits of AI in education at its optimum.

4.2.1. Thematic Analysis

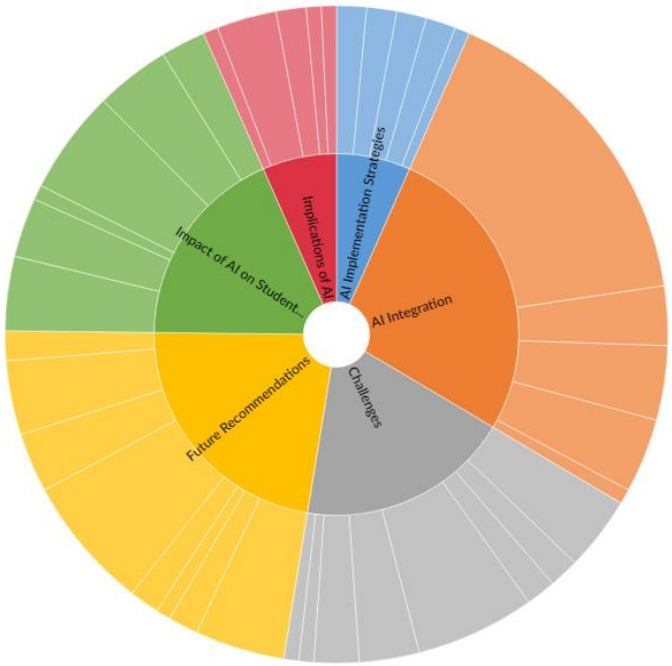
The themes identified in this study are shown in Figure 4.1. As seen through this figure, various themes such as AI Integration, AI Implementation Strategies, Impact of AI on academic and IT staffs Experience, Implications of AI, Challenges, and Future Recommendations were present. These themes are discussed in detail in the following sections.

AI Integration theme focuses on how AI technologies are applied in the teaching/learning processes of institutions. CU and the UWTSD institutions' integration practices could be compared based on how AI is operationalised in these institutions and the extent to which AI has been integrated into pedagogy. Concentrate on how these universities have integrated AI for instructional delivery; new technologies such as adaptive learning environments, chatbots, and artificial intelligent assessment can be reviewed.

The ***AI Implementation Strategies*** theme describes and discusses the number of strategies undertaken by institutions for integrating AI into education. When investigating the specific strategies adopted by CU and UWTSD institutions, the effectiveness of the approach used for AI development can be analysed, and the areas that need to be improved can be identified.

Another theme, the ***Impact of AI on Student Experience,*** discussed how the usage of certain AI tools affects student interactions, academic performance, or satisfaction levels. The overall impact of AI on students' results, engagement, and interest is analysed by looking at the results of CU and UWTSD. It also includes an evaluation of perceived efficacy and an examination of what contributes to variations in, or barriers to, experience or outcomes.

The implication of the AI theme focuses on the wider challenges and the ethical question raised by the application of AI systems in higher learning institutions. When analysing teachers' and learners' rights, biases may be possible in AI-based assessments, and there are prospects for education positions and class interactions. The questions related to this theme also cover whether the AI learning approach may diminish the effectiveness of conventional class approaches. The theme also investigated whether AI tools mediate or undermine educational equality or if AI implementation changes the teaching paradigm.



(Source: Created by the researcher, 2025)

Figure 4.6: Themes for assessing AI Implementations in Higher Educational Institutions

The challenge theme defines the barriers and obstacles present in the process of AI implementation, including technical hurdles, ethical issues, and organisational resistance. By highlighting these issues, the theme noted that both universities have to address by developing mitigation strategies to overcome them, for instance, faculty preparedness, students' flexibility, or data protection. This finding shows that if these challenges are understood, it can clarify how well perceptions are related to educational outcomes.

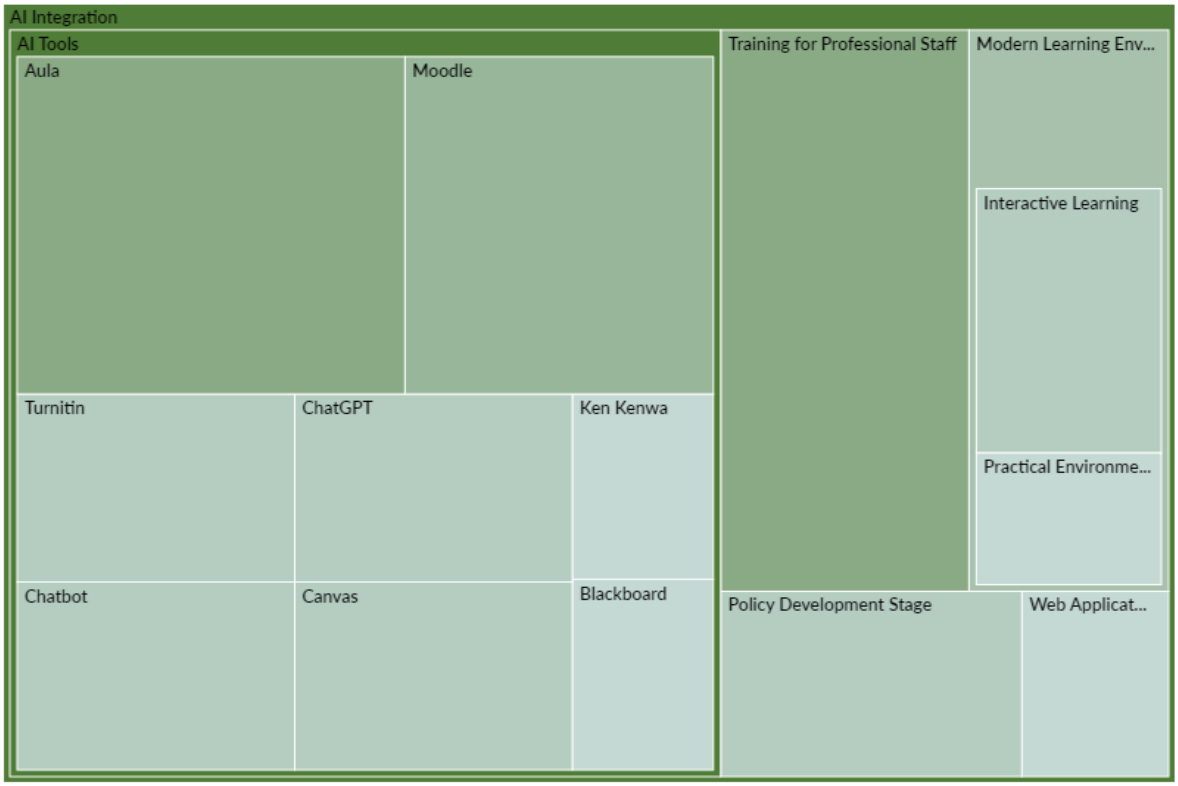
The future Recommendations theme provided recommendations related to the enhanced use of Artificial Intelligence in learning environments. Based on the data findings, the theme identified the measures for the improvement of AI implementation, including the best practices and possible areas of improvement at CU and UWTSD. Proposed solutions could comprise faculty professional development, repeated assessment of AI, or the development of community standards to support fair and effective AI.

Overall, these themes suggest that a comprehensive assessment of AI functions and capabilities in higher learning institutions is recommended, which will help to shape future AI-centric learning activities.

4.2.2. AI Integration in Pedagogy Practices

The modern environment of learning contains components including a practical environment and interactive learning. This finding shows how AI participates in conducting adaptable and engaging learning spaces. The findings have indicated that various learning platform tools such as Aula, Moodle, canvas, blackboard, Turnitin, Chatbot, Content Recommendation Systems Automated Essay Scoring, Virtual Labs, EdTech Apps, Student Engagement Analytics, Peer Review and Collaboration Tools help to improve pedagogy practices. Analysing such environments in UWTSD and CU tends to reveal how AI tools are implemented to make learning more practical and interactive, affecting student performance and interest. This research also compares how AI tools actively encouraged advanced classroom experiences and whether both educators and IT staffs support improving pedagogy practices.

Figure 4.7 shows the current state of AI integration across higher educational institutions in the UK, specifically for CU and UWTSD. According to many interviewees, these universities adopted AI tools such as Aula, Moodle, Turnitin, ChatGPT, Canvas, Blackboard, Chatbots, and Ken Kenwa. However, it was in the policy development stage and adopted a modern learning environment with interactive learning and a practical environment. Moreover, they opined that they are providing training for staff including academic staff.



(Source: Created by the researcher, 2025)

Figure 4.7: AI Integration in Higher Educational Institutions

Educators:

Educators shared their experiences and visions about how artificial intelligence (AI) has reshaped teaching and learning in an evolving educational landscape. Interviewee 1, an economics and finance lecturer, used AI tools like ChatGPT, plagiarism detectors, and Canvas to transform

teaching techniques (Figure 4.7). One interviewee 1 argued that AI has become a trusted technology to provide an engaging and richer educational experience.

Many interviewee (2, 3, 7, 8, and 9) reported that AI tools as a revolutionary technology in education and demonstrated that AI technologies were adopted in institutions, such as personalised learning tools, automated grading systems, and AI tutors. These innovations provided promising solutions, such as operational efficiency, improved outcomes, and tailored learning experiences. According to the view of Interviewee 3, AI tools like Padlet improved student engagement, and Outlook facilitated digital learning at CU. Further, the interviewee 3 also explained that AI enriched our curriculum and online courses. On the other hand, Interviewee 4 said that UWTSD relied on Moodle, but complete integration into course planning and assessments would take time. Interview 2 also quote, "we have not fully adopted, but the process was initiated a couple of years back when we started bringing in and embedding some of the artificial intelligence based systems and apps into our day-to-day operation. And I'm very proud, very proud to say that that in the areas of student assessment and maybe their engagement as well as in even in admission side".

Interviewee 5 also mentioned that the UWTSD was in the process of being drafted for course materials and assessments, but the foundation needs to be established. Interviewee 6 emphasised that the AI tool had the potential to improve efficiency and personalised learning, and Interviewee 7 opined that classrooms were reshaped with the adoption of intelligent tutoring platforms, learning systems, and chatbots. Interviewee 12 expressed optimism by saying that "the learning environment have moved from traditional Orthodox learning environmental into most modern learning environment, that's what it is. And that is something to do with the artificial intelligence, which is not becoming an integral part of our teaching sessions. For example, there are some integrating operating apps whereby we involve, we engage our students".

Interviewee 8 commented that AI could engage students and foster active participation based on customised learning experiences. Interviewee 9 remarked that, AI has assisted both educators and students by optimising learning experiences and automating administrative tasks. Interviewee 10 argued that AI as a tool to streamline the education needs of students through real-

time feedback and personalised learning. In support of this, Interviewee 11 also reflected those platforms like Canvas enhanced student engagement and streamlined tasks. In addition, “adoption should be thoughtful or cautioned” to harness the potential of AI. Interviewee 12 demonstrated that AI tools provided personalised experiences and access to knowledge within inclusive environments of the university. Interviewee 12 added that AI is paving a new era for the education field by breaking barriers.

IT Staff:

The diverse perspectives of IT staff suggest that the integration of an AI tool transformed the education system by navigating innovation. Interviewee 16 shared insights into the early efforts to harness the power of AI and mentioned that personalised learning platforms, automated grading, and virtual tutors were primary steps toward revolutionising teaching and learning. For example, the Aula platform integrated with AI features to interact with students, providing an efficient and interactive educational experience. Interviewee 17 highlighted the significant role of AI in improving administrative and academic processes. AI tools like Aula and Turnitin have created an adaptive and more connected learning environment along with chatbots for personalised learning and enhancing student engagement.

Interviewee 18, an IT technician, discussed that universities like CU and UWTSD relied on Moodle and virtual learning platforms and were still underway to implement AI tools fully for pedagogical practices.

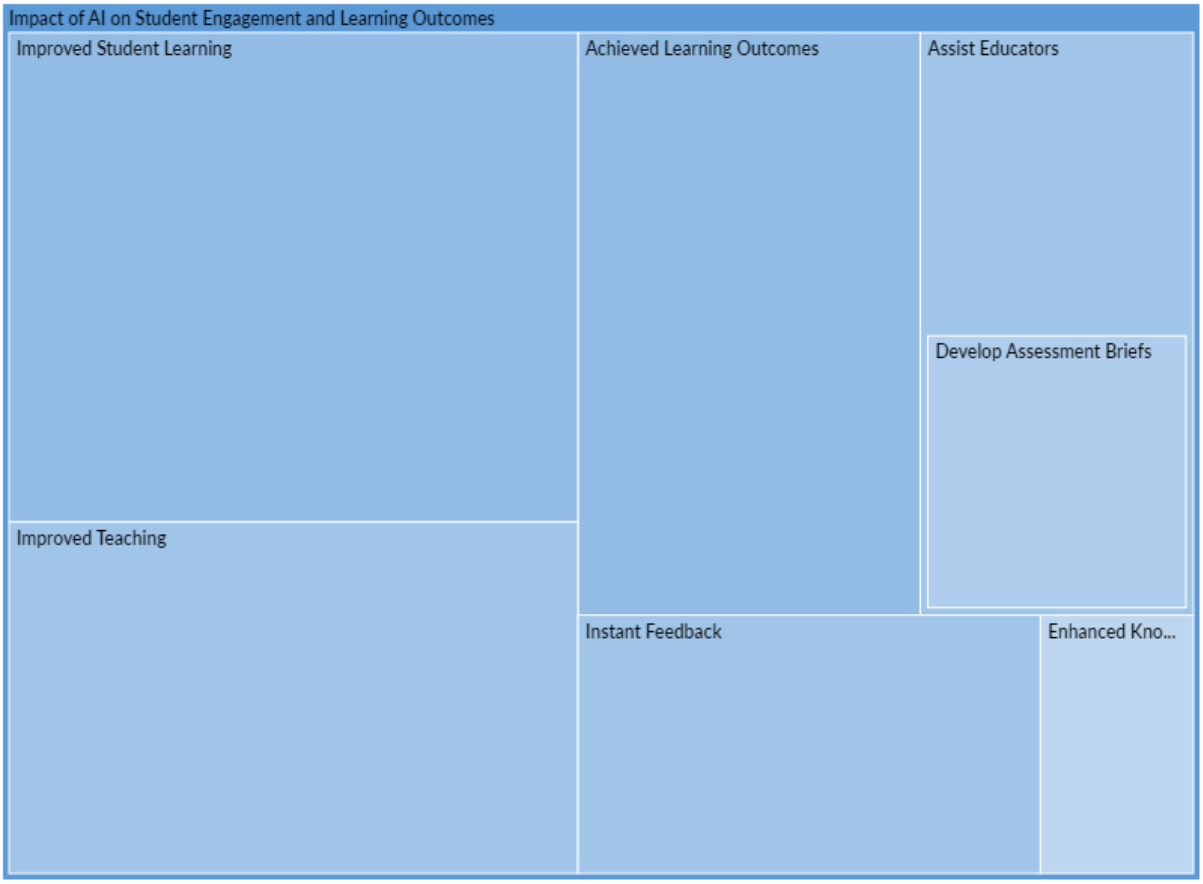
Here Interviewee 18 said, “Our university has not been using very specific software which only based on AI but some of the platforms ((e.g.Turnitin, Aula, Chatbot,) are integrated with AI features”.

Interviewee 19 shared that the university's commitment to progress is similar to the views of Interviewee 16. The universities have taken steps to improve the learning experiences based on AI tools like the Aula platform, automated grading systems, and virtual tutors. These integrations of AI were setting the stage for a future where AI would play a crucial role in education.

Both educators (interviewees 1 and 2) and IT staff (interviewee 16) opined that AI tools as transformative technology for pedagogy practices. Educators mostly focused on the ability of personalised learning, while IT staff recognised the positive aspect of AI when integrating into the existing platforms. Both groups agreed that AI integration is still at a basic level at universities. For example, IT staff (interviewee 16) and educators (interviewee 2) described the use of virtual learning platforms like Moodle, chatbots, and Turnitin as foundational rather than advanced systems. Educators focused on determining how AI improves teaching and learning directly using virtual systems like Aula and virtual tutors. On the contrary, IT staff emphasised the technical integration and scalability in the existing education systems. Educators (interviewee 4) showed optimism toward the future role of AI in personalised learning, while IT staff (interviewee 16 and 17) identified the needs and current limitations of AI tools in education. In conclusion, the perspectives of interviewees regarding AI integration at CU and UWTSD universities disclosed that educators focused on learning and teaching experiences, and IT staff discussed systemic and technical priorities.

4.2.3. Effect of AI on Academic Performance, Learning Outcomes, and Student Engagement

Another tree map is introduced in Figure 4.8 that underscored major perspectives and insights into the AI's effect on learning outcomes and student involvement within higher educational organisations, particularly the UWTSD and CU. It shows that AI helps to improve student learning, achieving learning outcomes, assist educators, tailoring the resources as per the individual learner, develop assessment brief, improve interacting session, instance feedback, detect plagiarism resources, and overall improve teaching and learning in higher education.



(Source: Created by the researcher, 2025)

Figure 4.8: Effect of AI on Teaching and Learning Practices in Higher Educational Organisations

Based on the qualitative data findings (Figure 4.8), many interviewees (educators and IT staff) disclosed that AI has influenced the teaching and learning practices positively. However, they shared that they improved student learning, provided instant feedback, achieved learning outcomes, assisted educators, enhanced knowledge, and developed assessment briefs to meet the tailoring needs of students.

Educators:

Interviewee 1 shared that AI tools like ChatGPT and Grammarly provided instant feedback for students that would allow them to refine their skills and sharpen their analytical skills. He also discussed that his student felt that it's like having a tutor who knows better than myself. Interviewee 2 supported interviewee 1 statement and emphasised that AI-empowered students by catering to different learning styles and providing easier accessibility to course materials. However, interviewee 3, and 4 suggested that we have to encourage our students and ourselves to use various AI tools but educate them to use with integrity and honesty. Whilst minority interviewees mentioned that the wide open of AI tools in higher education will have a negative impact on their learning.

"AI tools have a positive impact on teaching and learning practices in higher education".

"Look at the impact that is having on their learning, so they are responding positively to it, to artificial intelligent".

"I think AI tools have equally positive and negative".

"AI is a revolutionary. It is useful, it is powerful".

The above quotations of various interviewees have demonstrated that the AI tools have both negative and positive impact on pedagogy practices. However, majority of the interviewees have stated more positive than negative on the learning and teaching process.

Furthermore, both interviewees 3 and 4 highlighted the students' wonder about assistance and quicker responses. In addition, AI tools help students dig deeper into topics and explore applications. Specifically, interviewee 4 realised the responsibility of using AI since it can lead to dishonest academic risks and allow students to depend on shortcuts.

Interviewee 5 discussed that their students adapt AI tools and help them to stay motivated with the adjustments of individual preferences using tutoring platforms and interactive quizzes. Similarly, interviewee 6 also noted that students appreciated the AI in terms of creating a self-

paced environment and felt more engaged. “It made me feel like the classroom that was built for everyone,” shared student interviewee 7. AI-powered tools overcame barriers of traditional teaching by offering speech-to-text services and language recognition features. Interviewees 8 and 9 emphasised that AI tools promote inclusivity by addressing various needs and encouraging a sense of equality. Interviewee 5 recounted how some students worried that the reliance on AI could turn classrooms into transactional environments by diminishing the educators’ role and were concerned about the loss of human connection with AI-driven learning. Interviewees 10 and 11 pointed out the need for inclusive practices among students to shift to AI-powered learning. Interviewees 8 and 15 shared the student stories whose confidence increased with the AI tools, which provide adaptive learning paths and personalised feedback. In addition, interviewee 14 said, “It’s not just about better grading, but providing a connection with their academic journey.”

IT Staff:

Interviewee 16 demonstrated that AI-based systems provided tailored feedback for students, and not all of them were comfortable embracing the content owing to concerns about misuse identification. It indicated that IT teams should establish trust among students and educate the users on ethical practices of using AI tools. Interviewee 14 explained, “AI is not just a tool, and it is an enabler,” indicating that features of AI allowed academic staff to focus on teaching activities while benefiting students. Interviewee 16 highlighted that the AI role remained underdeveloped in pedagogy, although tools like SPSS and Turnitin improved workflows. It indicated that IT teams need to bridge the gap between educators and students to enhance student engagement and learning outcomes. The student experience was fostered in terms of engagement and improved learning outcomes using AI tools like virtual assistants and grammar-checking software, as explained by interviewee 16. According to him, students can get assistance from these tools to do assignments in a better way and improve their confidence levels. Similarly, interviewee 17 stated that “I believe, AI tools have been effective in pedagogy process. Academic staffs have been provided positive feedback” however, on the contrary, Interviewee 16 said, “there are many challenges such as fundings, training, we face in order to integrate and implement tools in learning and teaching purpose”.

Both IT staff and educators highlighted the important role of AI in facilitating adaptive learning styles and immediate feedback while catering to diverse student needs, such as grammar and speech-to-text functions. They also mentioned that AI tools provided various benefits, such as fostering inclusivity, improved student engagement, and personalised learning experiences. From the pehuman rspectives of educators and IT staff, AI empowered students in their academic journeys by enabling them to build confidence and overcome academic challenges with the use of tools like virtual tutors and chatbots. Both groups acknowledged the data privacy issues and ethical concerns as challenges to improving student experience or academic integrity. IT staff and educators agreed that AI integration into education should need collaboration among educators, learners, and technical teams to gain potential benefits and address the gaps in implementation.

4.2.4. Challenges of AI Implementation in Higher Education

The following are the challenges derived from the interview. To explain in a more constructive way, a branching model has been introduced in Figure 4.9 that classified the key barriers into diverse segments, each participating in the entire complexity of incorporating AI within the context of higher education. From this figure, it is obtained that inefficient management and leadership direct slow integration or resistance of AI equipment to insufficient leadership in developing the principles of AI. In challenges, the normal complexities in adopting strategic transformations are integrated with management concerns, possibly resulting in a lack of a clear direction and vision in implementing AI. However, IT staff and educators at both universities observed a lack of effective leadership as a challenge to efficiently applying AI equipment.

(Source: Created by the researcher, 2025)

Figure 4.9: Concerns of AI Applications in Higher Educational Settings

Educators:

There are a number of challenges found from the Interviewees' interview. Interviewee 1 acknowledges that "at first, I was excited." The possibility of promoting accessibility, automating grading, and tailoring learning was exciting. Then reality came out and taught us strictly. My student started acquiescing spookily perfect coursework. It was developed through AI that I was reading and not their voice. Afterwards, the room droned in contract. Issues regarding the over dependency on data privacy, AI tools, and the declining human trace in education were converted into the core of the explanation. It was initiated as a rise into the future and was also considered as a little into reliance.

An older educator (Interviewee 2) shared a combination of concern and frustration that it was about us ("educators") and not just about the capabilities of AI. In this scenario, a few colleagues of mine were cautious. They lost their control, feared the unknown, and finally lost their jobs. Another key challenge was technological barriers. All the institutions do not possess the adequate resources and infrastructure to train and teach us. The words of this interviewee were suspended largely in the air. Interviewee 2 said resistance was a defense against the fear of being obsolete, an emotion reflected by several others, and not merely a refusal to evolve.

A middle-aged lecturer (Interviewee 3) stated that “time is our enemy.” Who has the time to study AI between administrative duties, research, and teaching? And how do we even initiate without institutional assistance? The educator's words echoed a common issue. The commitment to AI felt like an unsatisfied forecast, restricted by time constraints and limited funding. Therefore, traditional approaches still apprehended their basis, and the balance was considered highly complex.

A tech-savvy professor (Interviewee 4) learned increasingly, and prevention manifested that very few people understand AI, but all were talking about it. I am indicating real AI (such as natural language processing machine learning). A particular gap was there between practical and theoretical knowledge. The students misuse the equipment of AI for dishonesty and there was a lack of faculty training. Moreover, we were losing while we were playing catch-up. The interviewee confessed that the heads moved seriously. For AI, the interest was dominated by the fact of misuse by students and underprepared faculty. Therefore, vigilance became a requirement compared to an option.

A younger educator (Interviewee 6) shared that everyone does not possess the availability of this particular technology. A digital classification was there. AI possesses the possibility to enlarge the gap between underprivileged and privileged students, conducting an emerging approach to educational inequity. The concern of this interviewee was reflected by other people who emphasised that AI was a symbol of enhancing classification and also a tool. The benefits or advantages of AI tend to be reserved for some people without equitable availability.

A seasoned faculty member (Interviewee 7) underscored that the ethical concerns were incredible to avoid. It reflects the biases of the people who conducted it. The interviewee stated that they were associating systems that can unfairly judge students and continue stereotypes. This interviewee confessed that “we were in trouble if we did not address such biases.” This situation caused a debate regarding AI’s ethical applications in possible long-term effects, fairness, and student assessments on learning outcomes.

Educators (Interviewees 5 and 8) showed anxiety that echoed throughout the room: the AI application's cost was staggering. Training, maintenance, and infrastructure upgrades were all additional. A major challenge was institutions with tight budgets. The AI commitment was dominated by financial realities for many people. The AI initiative's long-term sustainability was uncertain, leaving few institutions uncertain to spend largely.

Here, some of the surprising findings from the interview:

Interview 1 stated that "Ultimately, the purpose of jet GPT is not to stop human working is to help them work better. They can use it to collect the information and develop it on their own. OK. It's always going to be good".

Interview 2 stated that "They are all adopting artificial intelligence and we try to get our students ready to cope up with the challenges faced at a real business world and with that purpose"

Interview 14 stated that "the first challenge of what I feel is the adoption by the faculty members because maybe not everybody is willing to change themselves".

A senior educator (Interviewee 12) concluded the collective emotion: "AI cannot replace us." This interviewee stated that AI was not a teacher; rather, it was a tool. He said they need to confirm it complements their methods and not defeat them. However, the balance was difficult to attack with several unresolved concerns, including ethics, infrastructure, resistance, and privacy. Such opinions emphasised a significant truth while AI contains the commitment to transforming education stating that the road to relevant association was troubled with concerns. Therefore, addressing institutional, ethical, and technological challenges was imperative and also necessary. Moreover, educators connect the power of AI accountably and conduct a future where humanity and technology live in the classroom.

IT Staff:

IT staff (Interviewee 16-18) were indicated some of the challenges such as various challenges such as compatible issues, and regular training programs for academic and IT staffs. Most important

challenge is fundings which really creates ultimate thereat to implement AI tools as many current systems needs replacement with up-to-date system. Currently, higher education has been passing very difficult time due to financial issues. Data Privacy and Security is another significant concern as AI tools need to comply with GDPR. University needs to protect everyone's data. Sometimes, there is a resistance from the academic staff to make coordination to implement AI tools in teaching and learning.

A senior faculty member (Interviewee 13) stated that "it is always about the money." Their budget was slightly stretched. This interviewee confesses that "we were anticipated to incorporate such cutting-edge AI equipment, yet there was insufficient funding to maintain the present infrastructure".

On the contrary, the most striking finding to emerge from the data is that IT Manager (Interviewee 16) came with a steady voice and with little frustration. He said that there was a concern about system compatibility even if they give adequate funds. Their legacy systems were not developed to associate seamlessly with advanced solutions of AI.

Another faculty member (Interviewee 15) also participated. She said that the inadequate communication of central administration is not assisting either. She explained that we were the people who needed to incorporate them even if the discussion was made effective. She had a query: "How can we succeed when we are kept in the dark regarding AI strategies?"

A representative from the IT department (Interviewee 16) came and stated that there was a wider structural concern beyond resistance and funding. Student retention and recruitment were continuous concerns. This interviewee also asked a question "How do we defend investing largely in AI when we were struggling to maintain enrolment numbers?"

IT staff and educators agree that insufficient funding stands as a significant challenge to AI adoption. Both groups considered that financial challenges restricted the training programs, infrastructure upgrades, and AI tools' purchase. Interviewees 13, 14, 15, and 16 recommended funding as a major barrier to implementing AI technologies. Therefore, both groups determine the

significance of continuous training to confirm the successful implementation of AI. Educators underscore the insufficient opportunities for formal training, while IT staff ascertained the requirement of technical training for a comprehensive application. However, interviewees 4, 13, and 16 emphasised the requirement for more opportunities and training sessions for staff development. It was obtained from the session that resistance from staff is considered a shared issue. Hence, educators were aware that AI leads to replacing the traditional methods of teaching, while IT staff was resistant to unfamiliarity with the fear of job transfer or technology. Therefore, interviewees such as 2, 6, 10, and 11 emphasised the unwillingness among administrators and educators to hold AI.

At the same time, both groups showed their awareness regarding the ethical data application and safeguarding of student information. Hence, confirming compliance with certain privacy regulations stands as a shared concern. Interviewees such as 2, 7, 8, and 14 stated the requirement to address data privacy and security in the implementation of AI. However, IT staff concentrated more on technical issues, including the association of AI equipment with prior legacy systems and system compatibility. Educators were more aware of the practical implementation and usability of such equipment in the classroom location compared to backend technicalities. Specifically, interviewee 14 demonstrated system compatibility, whereas educators initially illustrated training and usability.

On the contrary, IT staff slightly concentrated on this factor and more focused on confirming its sustainability and assisting AI deployment. Interviewees such as 1, 6, and 12 emphasised fears regarding AI decreasing the human component in education, while the IT staff concentrated on operational concerns. However, IT staff were more concerned on the operational side and execution, stating frustration over inadequate staffing to assist AI initiatives. Interviewees such as 15 demonstrated insufficient communication or interaction from key administration, whereas Interviewee 16 concentrated on the lack of staffing affecting the application. Alongside, IT staff are more focused on the long-term effect and sustainability of AI systems, considering technological updates and maintenance costs. Furthermore, educators were more concentrated on urgent aspects such as academic integrity, student engagement, and training. Interviews such as 10

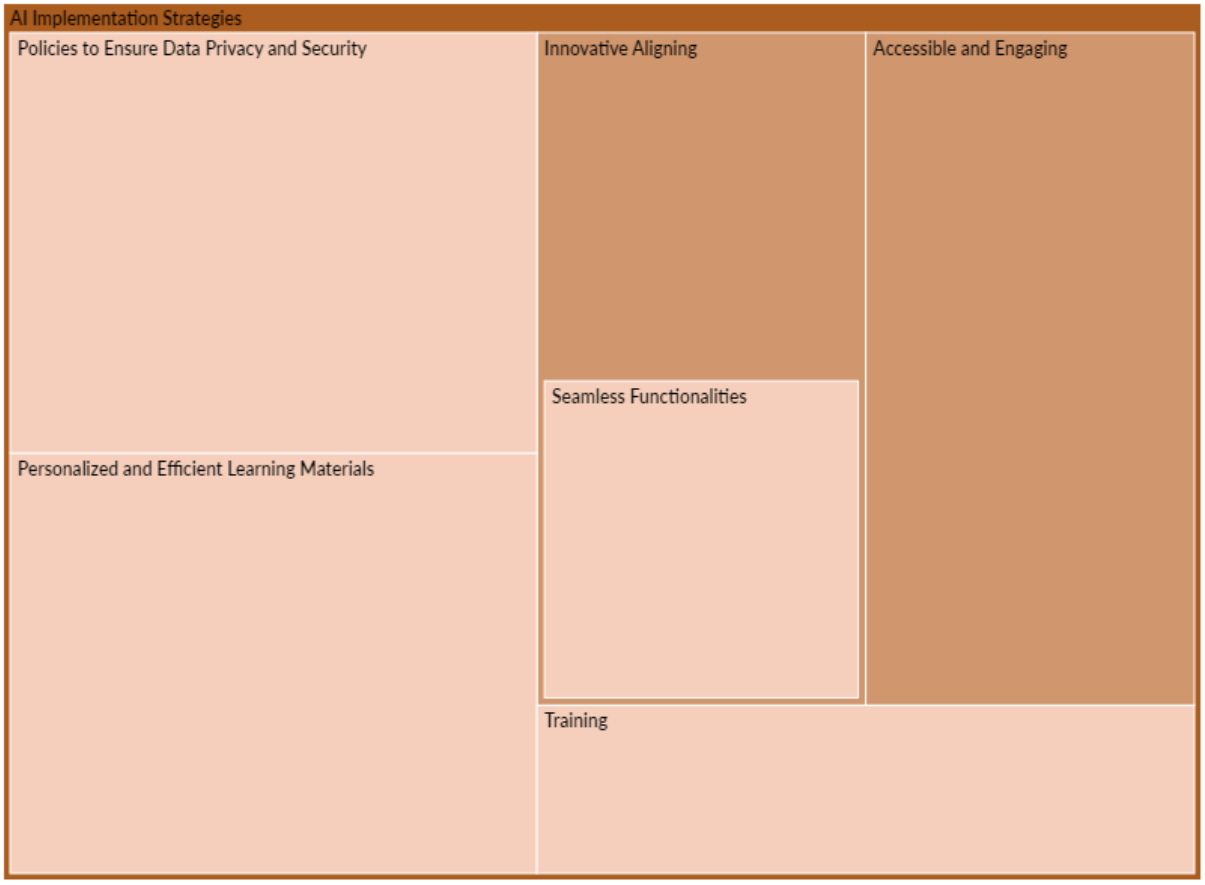
and 16 stated sustainability, while the particular educators demonstrated the urgent practical adoption of AI applications in classrooms.

Finally, while both IT staff and educators share common aspects about data security, resistance, training, and funding, their insights deviate from human-centric, strategic, and technical aspects. Moreover, a collaborative method that addresses the concerns of both groups seems crucial for the successful association of AI in the educational context.

4.2.5. Outcomes and Strategies of AI Implementation

The following are the outcomes strategies of AI implementation from the interview of educators and IT staff. The strategies for "AI implementation" in higher education organisations are presented in Figure 4.10. it has indicated that the strategies for "AI implementation are policies to endure data privacy and security, innovative aligning, accessible and engaging, personalised and efficient learning materials, seamless functionalities, Training and development programs.

Some interviewees mentioned (interviewee, 3, 5. And 14) that, in the policies to confirm "data security and privacy," the CU and UWTSD have effective policies for data privacy to protect sensitive student data, particularly provided its larger and more different student population. On the other hand, some interviewees mentioned that UWTSD possesses comparatively fewer issues around the construct of "data privacy," possibly for a smaller base of students and less difficult AI implementation in application. The approach of UWTSD was more flexible, concentrating on ease of availability while balancing primary security standards.



(Source: Created by the researcher, 2025)

Figure 4.10: AI Implementation Strategies in Higher Educational Institutions

The key findings of the views amongst interviewees regarding AI implementation strategies in HEI are follows

Educators:

Interviewee 1 described how AI became a trusted partner tool for teaching methods. It allowed for tailored learning experiences and helped create dynamic course materials. He also mentioned that the training for AI was informal and needed to learn using platforms like YouTube and peer-to-peer learning. Interviewee 14 said that the AI integration would become successful with the implementation of strategies in terms of collaboration, scalability, and curriculum design.

It was also crucial to maintain partnerships with AI experts and tech companies to choose adaptable solutions for education demands. AI tools created a self-paced and structured learning environment for students, according to the perspective of interviewee 3. He also insisted that it was required to provide comprehensive training for educators to unlock the full potential of AI tools. Interviewee 4 shared that the journey of implementing AI in the university was still theoretical and limited to individual experimentation for practical applications. She also admitted that the university should shift to structured implementation since staff awaits formal training programs. Interviewee 5 also waited for guidance to learn AI in an institution-wide and cohesive strategy, specifically for assessment-related tasks. Interviewees 6 and 7 highlighted that AI plays a crucial role in education due to its effective integration, ethical framework, and robust digital infrastructure. They also discussed that institutions should have to adopt AI into the current pedagogical practices without making changes to traditional teaching.

Interviewees 8 and 9 reported that universities should have to start with pilot programs before implementing AI in the education departments. They should also consider training initiatives as key priorities for students and staff in the AI-driven landscape. Interviewees 10, 11, and 12 opined that institutions should invest in providing comprehensive training for educators while focusing on AI tools that align with the strategic goals. They also pointed out that the collaboration among IT professionals, administrators, and academic departments was an important aspect to ensure that AI serve as a great tool for teaching and learning. According to the educators' view, future education was about transforming how they teach and learn, not only about integrating AI.

IT Staff:

As Interviewee 13 said, "We're the troubleshooters, and we're the ones who ensure that the AI technology should work as intended." Although the central system took decisions and deployment of AI tools, IT staff was involved directly to make sure that these systems operated smoothly, including one-on-one assistance for teachers in classrooms and training for academic staff. Interviewee 14 explained, "Our focus is on the infrastructure," and detailed that his team

maintained the collaboration among stakeholders and academic staff by conducting training sessions and regular workshops. In support of interviewee 13, interviewee 15 also mentioned that we are enablers, not the decision-makers. However, his team committed to providing consistent support for educators to meet educational innovation while serving as a bridge between the daily needs of academic staff and the decisions of the central office. Interviewee 16 reflected, "We are the ones who transform the strategic plans into action." In a similar view, interviewee 13 also shared that the IT team was involved in the smooth deployment of AI across campus activities while facilitating technical support for administrative and academic staff. Based on these opinions, we could conclude that IT professionals assisted educational institutions in establishing the infrastructure, troubleshooting challenges, and providing ongoing training for educators. This collaborative approach ensures to implementation of AI tools efficiently and utilises their potential capabilities to improve learning outcomes.

Both educators and IT staff considered AI tools an opportunity to improve education and student learning outcomes. They agreed that training is important for educators to unlock the full potential of AI technologies while considering teamwork or collaboration critical to implementing AI technologies successfully. In addition, educators were driven by educational and learning outcomes and the usability of AI in carrying out daily tasks. On the contrary, IT staff focused on improving the technical and operational efficiency of AI tools and viewed themselves as enablers for pre-decided strategies by concerning about backend functionality. Both educators and IT staff are committed to leveraging AI in educational institutions, but the implementation is from different perspectives. IT staff prioritised the technical feasibility and infrastructure, while educators focused on student engagement and pedagogy.

4.2.6. AI Implications on Traditional Learning Environment

From the qualitative finding, the conducted word cloud has been introduced in Figure 4.11, underscoring major themes determined from the interview answers of IT staff and educators about the applications of AI in traditional learning landscapes within the HEIs ("higher educational institutions"), particularly the UWTSD ("University of Wales Trinity St David") and the CU

("Coventry University"). However, privacy issues are considered another essential concern illustrated.

(Source: Created by the researcher, 2025)

Figure 4.11: Implications of AI on Traditional Learning Culture in Higher Educational Contexts

Educators:

AI helped educators and considered a trusted ally for providing personalised learning journeys for students, said by interviewee 1. He also expressed concern out that AI could eventually replace the teachers, resulting in job security challenges, and be paired with ethical dilemmas like misuse of ChatGPT in assignments. On the other hand, interviewee 2 has different view about equity and how to ensure all students can benefit from these advancements regardless of their background. This statement also resonated with interviewee 12, who raised questions about the transparency and fairness of AI-powered tools. Educational institutions should prioritise equity and accountability to ensure that AI is an inclusive force.

Interviewee 3 admitted that need more training to foster student engagement and provide personalised learning opportunities. In support of interviewee 1, interviewee 4 saw AI as a potential tool to automate administrative tasks and simplify assignments instead of relying heavily on. Interviewee 7 argued that AI integration should be inclusive and fair emphasising the societal implications. Interviewee 6 raised the question, "Are we de-humanising education?" and noted ethical and privacy dilemmas. In support, AI uncovered student learning gaps and stressed

the challenges of AI that need to be addressed, such as data privacy and responsible use, by interviewee 8. Further, interviewees 9 and 10 pointed out the warning of biases that AI systems might be reinforced and reminded us to manage their deployment carefully. Interviewee 11 captured a dilemma: "Will students lean heavily on AI and lose their creativity skills?" although it created personalised and transformative student learning experiences.

IT Staff:

Interviewee 13 reflected and who was incredibly positive about AI, "AI tools provide promising solutions, but need to add accessibility features and expand to reach international students." This implied that IT teams should establish an inclusive educational environment. In support of this, interviewee 15 said, "AI tools have the potential to build a revolutionised learning environment for student learning, but we need to make continuous investments in training." This means initiatives need to be made to design ongoing training programs and robust infrastructures for the efficient utilisation of AI. Interviewee 14 emphasised that data privacy and security are non-negotiable and need to protect the student's trust. Interviewee 16 opined, "AI-enabled classrooms provide inclusive learning with accessibility and transformative possibilities." All these views concluded that AI adoption should be done responsibly, inclusively, and ethically to enhance student learning and education outcomes that will set a foundation for building a more connected and smarter academic future in educational institutions.

Both educators and IT staff highlighted that AI is recognised as a revolutionary tool for teaching and learning through personalised learning experiences, automated tasks, and innovative solutions. Both were stressed the importance of algorithmic bias, data privacy, ethical dilemmas, and responsible AI use. In addition, they also highlighted the prioritised need for accessibility features for underserved and international students to increase inclusivity. They acknowledged the need for consistent training to integrate AI into pedagogy effectively. Educators focused on worried over-reliance on AI tools and loss of critical thinking among students. In contrast, IT staff focused on infrastructure development and resource management for effective AI integration rather than educational implications. Moreover, educators were concerned about job security and ethical

dilemmas in the automation of tasks. On the contrary, IT professionals were more concerned about the operational and technical challenges of AI, such as system integrity. These differing points need to improve collaboration between these educators and IT staff to implement AI technology in higher education successfully and responsibly.

4.2.7. Future Recommendations or Suggestions for AI Applications in Higher Education

The following are the outcomes for future recommendations on AI implementation from interviews with educators and IT staff. The figure 4.12 is a structured conception, possibly a tree map, emphasising key suggestions for successful AI adoption in HEIs. The findings have indicated that formal training and development AI programs (both students and educators), improve resources, improve adoption, comprehensive strategies, risk assessment, personalised learning styles, effective integration, ongoing staff training, ethical collaboration, empowering people. Therefore, this finding of the interview ascertains strategic segments for development based on the outcome from qualitative data, which integrates with the study aim of improving AI association in educational settings at both the UWTSD and CU. The area of formal training is emphasised as essential, directing the requirement for structured and detailed training schemes for staff and educators. It is obtained from research that effective training led to helping stakeholders' assessment and implementing AI equipment effectively, increasing their advantages in both learning and teaching.

(Source: Created by the researcher, 2025)

Figure 4.12: Future Recommendations for Successful Implementation of AI in Higher Educational Institutions

The key findings of the views amongst interviewees regarding future recommendations for AI application in HEI are follows:

Most of the interviewees (educators and IT staff) shared their future recommendations, such as the need to improve formal training and comprehensive strategies, including ongoing staff training, effective integration, and risk assessment. In addition, they also recommended strategies, including enhanced adoption, personalised learning styles, improved resources, data privacy, ethical collaboration, and empower people to implement AI successfully in higher educational institutions across the UK, specifically for CU and UWTSD.

Most of the educators (Interviewees 1, 2, 3, 5, 8 and 11) stating that AI was a double-edged sword as he flips through several pages. It led to enabling educators and promoting learning in case practice carefully. The educators (Interviewees 4, 6, 7, 9, 10, 11 and 12) stated that they need to tread because ethics need to be at the forefront.

It was also worth noting that educators and IT leaders obtain themselves at a crucial crossroads at the core of an active campus of the university amidst a culture of changing technology. In response to question 3 and 5, IT supervisors (Interviewees 15 and 16) memorised the active explanation from the prior week regarding the AI future in education while sitting in the particular conference room. Interviewee 5suggested that "if we need AI actually to shift our classrooms, we require more than the tools that we require vision," emphasising around the desk at his colleagues. However, enhanced funding was at the forefront of the list, an emotion shared by specific interviewees 13, 15, and 16. Therefore, all those interviewees agreed that the AI potential tends to remain untapped without significant investment, hindered by isolated innovations instead of the associated solutions.

Both IT staff and educators highlight the significance of continuous training for particular academic staff to implement the AI equipment actively. Educators emphasise integrating lecturers/tutors with the skills to associate AI into their teaching. At the same time, specific IT staff suggest training for both IT personnel and academics to promote technical proficiency throughout the board. Educators observe AI as equipment for developing student outcomes and curriculum enhancement, highlighting its effect in complementing teachers. However, IT staff imagine wider AI implementation, including conducting AI-based worldwide learning environments and lecture rooms to increase educational collaboration and accessibility.

Finally, while both the IT staff and educators agree on the requirement of ethical considerations, training, and funding, their insights differ in concentration. However, educators were focused on student involvement and pedagogical enhancements, whereas particular IT staff prioritise infrastructure development and technological innovation to confirm sustainable AI

associations. Moreover, such complementary perspectives facilitate a detailed roadmap for the active implementation of AI in education.

4.3: Summary of Qualitative Analysis

This section presented the thematic analysis from the 19 interviews (both educators and IT staffs) to accomplish objectives and aim of this research, to critically analyse and assess the appropriateness, efficacy, and extent of AI implementations in the context of educational endeavors within HEIs. The summary of the findings of the interviews are presented in table 4.9 below:

Themes	Objectives	Key Findings
AI Integration in Pedagogy Practices	To evaluate the current state and integration of artificial intelligence tools and methodologies within the pedagogy practices at Coventry University (CU) and the University of Wales Trinity St David (UWTSD).	Various learning platform tools such as Aula, Moodle, canvas, blackboard, Turnitin, Chatbot, Content Recommendation Systems Automated Essay Scoring, Virtual Labs, EdTech Apps, Chat GPT, Grammarly, Student Engagement Analytics, Peer Review and Collaboration Tools help to improve pedagogy practices.
Effect of AI on Academic Performance, Learning Outcomes, and Student Engagement	To analyse the effectiveness of AI-driven pedagogic tools and interventions in enhancing student engagement, learning outcomes, and overall academic performance at both CU and UWTSD, comparing and contrasting the results to identify best practices and areas of improvement.	Student learning, achieving learning outcomes, assist educators, tailoring the resources as per the individual learner, develop assessment brief, improve interacting session, instance feedback, detecting plagiarism resources, and overall improving teaching and learning in higher education.
Challenges and benefits of AI Implementation	To investigate and compare the perceived benefits and challenges associated with the use of AI for pedagogic purposes among	Inefficient management and leadership, adoption of new technologies, difficulty in using tools and applications, financial

in Higher Education	educators and students at CUL and the UWTSD	constraints, reliability issues, ethical challenges, successful implementation, shortage of IT staff are some of the key challenges of AI appropriateness and adoption in higher education.
AI Implementation Strategies in Higher Educational Institutions	To examine the AI implementation strategies employed by CUL and the UWTSD in their pedagogic practices.	The strategies for "AI implementation are policies to endure data privacy and security, innovative aligning, accessible and engaging, personalised and efficient learning materials, seamless functionalities, Training and development programs
Future Recommendations or Suggestions for AI Applications in Higher Education	To gather insights from educators, students, and IT staff regarding their perceptions, experiences, and challenges with AI in pedagogy, and based on these insights, provide recommendations for optimising the use of AI for educational purposes in higher education institutions in UK.	Formal training and development AI programs (both students and educators), improve resources, improve adoption, comprehensive strategies, risk assessment, personalised learning styles, effective integration, ongoing staff training, ethical collaboration, empowering people.

(Source: Created by the researcher, 2025)

Table 4.9: Summary of the findings of the interviews

4.4. Summary of Data Findings

Overall, this chapter has presented the findings found from both the questionnaire survey and interviews. This chapter dealt with analysing the integration of AI among higher educational institutions including the benefits and challenges offered by it with regards to CU and UWTSD. This study used quantitative surveys and qualitative interviews to collect and analyse these data. Firstly, according to the analysis of quantitative data, various insights were found regarding the

relationship between AI Integration and Educational outcomes: AI integration inhibits or slow down the creativity among students of HEIs, which was proven by the negative R-value of -0.192 and p-value < 0.01, indicating a significant negative relationship between AI integration and creativity. This study found that the R-value of -0.082 and p-value > 0.05 stated that there is no significant direct relationship between AI integration and academic performance. This finding means that simply by integrating AI, academic performance cannot be improved. The R-value of 0.123 and p-value > 0.05 indicated that there is a weak, non-significant positive relationship (limited influence) between AI integration and student engagement. The findings showed that AI integration has a moderate impact on learning outcomes, which was proved by the small but significant positive relationship ($r = 0.147$, $p < 0.05$) between the variables of AI integration and learning outcomes. Lastly, the data analysis also found that there is no significant relationship between AI integration and digital literacy skills (R-value = -0.067 and p-value > 0.05).

The study also conducted multivariate analysis and found that AI integration has a statistically significant relationship with creativity; however, with a small effect sise (F-value of 2.424, R-squared value of 0.041, and p-value of 0.049). There was no significant relationship between AI integration and Academic Performance (R-squared value of 0.027 and p-value of 0.187), suggesting other factors need to be included with AI integration to witness improved performance. Also, there is no significant relationship between AI integration and other variables like Learning Outcomes and Student Engagement, and this proves that there has been only a limited impact of AI on these variables. Moreover, additional strategies are required for HEIs to improve students' skills in HEIs along with AI integration, which was proven by the non-significant relationship between AI integration and Digital Literacy (R-squared value of 0.015 and p-value of 0.479).

The moderation analysis of this study also provided significant insights into the study's moderating variables, such as Challenges and Benefits. Firstly, in the context of Challenges, there was a substantial relationship with the Creativity variable (Beta value of 0.188 and p-value of 0.003). This relationship indicated that challenges associated with AI integration can have the

chance to improve creativity.

On the other hand, this study also found that there was no significant moderating relationship found between Challenges and Learning Outcomes (p-value of 0.290), Student Engagement (p-value of 0.878), and Academic Performance (p-value of 0.251). This finding means that challenges associated with AI integration have no impact on these variables. Lastly, a marginal effect with a p-value of 0.060 was found between Digital Literacy and Challenges, which indicated that challenges associated with AI integration can modestly improve digital literacy skills. Secondly, in the context of Benefits, this study found that there was a strong moderation impact on the Creativity variable (Beta value of 0.369 and p-value of 0.000). This relationship indicated that the benefits associated with AI integration can improve creativity. Also, a nearly significant moderation impact was found with the Academic Performance variable (Beta value of 0.129 and p-value of 0.054), which indicated that benefits associated with AI integration could improve academic performance. However, this statement needs more supporting evidence.

On the other hand, there was no significant moderating relationship found between Benefits and Learning Outcomes (p-value of 0.884) and Student Engagement (p-value of 0.952). This outcome means that benefits associated with AI integration possess no impact on these variables. Lastly, there was a significant positive effect (Beta value of 0.150 and p-value of 0.026) found between Digital Literacy and Benefits, which indicated that benefits associated with AI integration could significantly improve digital literacy skills. In addition, this study found that there was a significant positive relationship between Challenges and Digital Literacy (R-value of 0.166, p-value < 0.05) and Creativity (R-value of 0.266, p-value < 0.01), and this indicated challenges can motivate students to improve their digital skills and creative ideas. Similarly, there was a significant positive relationship between Benefits and Digital Literacy (R-value of 0.226, p-value < 0.01) and Creativity (R-value of 0.431, p-value < 0.01), found and this indicated benefits also could motivate students to improve their digital skills and creative ideas.

From the qualitative analysis, the study identified several key findings that explain how AI technologies are implemented in higher education institutions, particularly at CU and UWTSD.

There are many AI tools such as chatbots, Blackboard, Canvas, ChatGPT, Turnitin, Moodle, and Aula have been adopted to improve course delivery and engagement. Education becomes more effective, open for more people, and interactive through using these tools. Besides, academic staff are unburdened by routine work and receive real-time feedback, giving way to higher learning effects and academic results. Staff training also appears to be one of the crucial components of AI integration, where CU and UWTSD are quite different. The study also emphasises the need to provide educators with appropriate skills in supporting AI tool usage among students. CU appears, therefore, to provide structured and sustained training as a possibly higher priority than training that is more ad hoc and as needed by UWTSD. These differences affect how effectively AI technologies are implemented and how much educators can prepare for AI-integrated instructional approaches. Technological learning environments based on AI are directed to enhance learning experiences. Many techniques can be used to assist learning with AI, whereby it is now possible to turn the conventional classroom into an innovative learning environment.

Policy making is another important process of CU, which is in the process of formulating regulations for the use of AI, and UWTSD is also in the process. Regulations are needed to deal with ethical issues, protect data, and fairness concerning learning applications based on AI technologies. CU needs developing and complex DP policies to align with its increased size, diverse student community, and legislation; UWTSD has less elaborate frameworks since its AI applications are not as numerous and encompassing as CU's frameworks. Another important aspect found to be relevant is the mechanisms of effective governance and policy preparedness for the efficient use of AI in HEIs. However, there are different challenges present in the integration of AI among HEIs, including technical problems, lack of funds, poor management and leadership, and concerns about the appropriateness of data utilisation.

Furthermore, it was identified that methodical differences are also present within CU and UWTSD related to using AI. As a bigger and more resourceful university, CU has a more working out and inclusive approach covering large training sessions, perfect tool affiliation, and a great account of data security. Hence, the strategy at UWTSD is different and more modest when it

comes to its specific application of AI, with a long-term focus across various subject areas that can be more pointedly trained and better leveraged in certain specific high-impact regions at present. The availability of resources influences this approach and most importantly, the focus on building and implementing AI that can be easily used by the end-users (students in this case).

From the findings of the interviewees' perspectives, future recommendations could involve the creation of detailed measures and strategies regarding how AI implementation will be strategically achieved, how staff will be trained continuously, how data privacy will be ensured, and how risk assessment will be addressed. HEIs should make adequate provision for AI projects, enhance the uptake of AI among teachers and learners, as well as enhance the compatibility of AI resources with curricular activities. There are certain additional approaches, such as incorporating the focus on ethical collaboration and adopting individualisation of learning. The recommendations also highlight the need to equip both staff and students with skills and confidence to work with AI to thereby create a supporting environment for AI adoption in the delivery of innovations in HEIs.

Chapter Five: Discussion

5.1. Introduction

This chapter discusses the empirical evidence, which was sought to understand, from the perspective of the various stakeholders, how AI are being used to support teaching and learning activities within UK Universities including Wales Trinity St David (UWTSD) and Coventry University (CU) as a case in point. In contemporary education, AI tools play a crucial role in pedagogical practices to enhance learners learning and teaching methodologies. Depending on the availability of resources and institutional objectives, AI integration or adoption is being varied across higher education institutions. So, this chapter provides insights into how both universities, such as CU and UWTSD, implemented AI technologies and to what extent they have influenced student learning and educator teaching strategies. This research adopted mixed research methods and used interviews and surveys, in order to provide understandings of the existing methods, difficulties, and potential advantages related to pedagogical interventions powered by artificial intelligence (AI). In addition, this study highlighted the benefits and challenges of AI implementation in higher educational institutions in the UK.

This study included 233 students from CU and UWTSD universities using mixed research methodology in order to explore the influencing factors of AI integration in pedagogy practices. The researcher used the survey method to collect data from students and the data indicates about 56.7 of respondents are male 42.9% are female to uncover the attitudes toward AI adoption that are influenced by factors like comfort levels with field-specific exposure or technology. This study included 54.1% of students from CU and 45.9% of students from UWTSD. Their responses indicated insights into pedagogical practices based on student perceptions and outcomes across these institutions. This finding clearly showed that CUL students were the majority of the participants in the survey due to the researcher is employed there. Moreover, the largest group of participants from 18-24 years old (53.2%), represented undergraduate students.

On the other hand, people from the age group age between 25-55 and above participants were limited in the study due to a number of reasons such as international students who mostly come to the UK to study from undergraduate courses. The age group between 18-24 may exhibit greater comfort levels with the use of AI tools. The sample was dominated by undergraduates (75.5%), while a smaller percentage of post-graduate and doctoral students were included in the study. Thus, this study reflected the student perceptions, who were mostly from undergraduates' groups, into AI adoption for understanding the typical learners' experiences, including both students and teachers. Furthermore, a qualitative study provided the perceptions of educators (n=15) and IT staff (n=4) from CU and UWTSD to investigate the factors that influenced AI adoption in educational practices in higher education institutions.

This study focuses on exploring AI integration and employed strategies at UK institutions, such as UWTSD and CU. However, the researcher has discussed how these AI tools were implemented across educational institutions and how they influenced factors like teaching practices and student engagement. The data findings disclosed to what extent AI technology has transformed the classroom environment and faced challenges by both institutions when adopting AI technologies efficiently.

Secondly, the study's focus shifts towards assessing the impact of AI-powered tools on students learning outcomes and academic performance. Based on the analysis of collected data from students and teachers, the researcher discussed how AI technologies influence student engagement and students' ability to achieve improved academic performance. The results would help to understand the influence of AI on student outcomes in alignment with the strategies implemented by both institutions.

Thirdly, the perceived advantages and challenges of AI implementation have been evaluated from mixed method studies. It is crucial to understand the perceptions of educators and students regarding the benefits and limitations of pedagogical practices. The data findings assist to comprehend the correlation correlate AI adoption with academic performance and student engagement. This study examined the technical and ethical challenges, such as data accuracy, data

privacy, and moral concerns to replace human interaction.

Fourthly, the contributing factors of each institution's success in AI adoption are discussed. These insights provide valuable lessons that can inform implementation strategies in the future across higher educational institutions in the UK.

Finally, the role of AI in students' engagement and learning was discussed while focusing on the accuracy and fairness of AI in reducing the reliance on traditional learning environments. In addition, data findings explored how AI tools can influence education practices and assessment procedures and transform conventional learning spaces. This chapter provides a comprehensive understanding of AI technologies and their appropriateness, adoption and implementation in pedagogical practices at UK higher education institutions, including UWTSD and CU. This study highlighted the challenges and opportunities for students, educators, and policymakers to improve AI adoption in higher educational settings.

5.2. Integration of AI in Educational Practices at CU and UWTSD

AI integration in both CU and UWTSD has been evaluated and investigating how AI can help to improve pedagogy practices and how it could create opportunities for improving student engagement, student learning, and teaching methods. This section investigates the implementation strategies of AI technologies, assesses the influence of these strategies on the educational experience of students and teachers, and compares the AI integration across two institutions.

5.2.1. AI Implementation Strategies

The result of the study indicated that AI integration has been aimed at investigating students learning outcomes and engagement at CU. Based on questionnaire surveys, AI tools have been implemented based on adaptive learning platforms, predictive analytics, and data-driven systems. However, AI tools assisted UWTSD and CUL in assessing performance patterns and student data while providing personalised learning pathways. The findings of this study showed that these tools provided an improvement in the academic performance of students. The educators

enabled timely interventions and identified the students' abilities to improve their engagement in the classroom environment. Neha (2020) reported similar findings, AI tools such as learning platforms, predictive analytics, and data-driven systems allow both students and professors to find areas where they might enhance their instruction. However, this finding is slightly contrary to previous study which has suggested that the AI tools are helpful for pedagogy practices, but it should be integrated with the traditional pedagogy practices (Abbas, 2024). The interview of educators highlighted that CU educators were satisfied with the use of AI tools with the support of the IT team. However, there were some challenges, such as the reliability of technology, and a lack of training for educators poses a challenge to use the tools effectively. Due to these challenges, some remain hesitant to use AI tools across departments.

On the other hand, UWTSD's AI implementation strategy focused on inclusivity and accessibility. The findings of this study disclosed that the university aimed to ensure student engagement with course content. In addition, this study demonstrated that the students with learning disabilities demonstrated an improvement in overall satisfaction and academic performance. This finding is consistent with that of Wang et al (2023) who found that AI tools can be used to engage the learners with the course content.

In addition, AI technologies, including AI-powered virtual tutors, speech-to-text systems, and automated transcription services to meet the student's personalised needs. These AI-driven tools assisted UWTSD in alleviating the barriers to student learning. Thus, a more inclusive environment has been fostered.

Similarly, Moate et al. (2024) highlighted the advantages of decentralisation in meeting specific academic needs and encouraging pedagogical innovation. A qualitative interview study illustrated that a decentralised approach to AI adoption was implemented. However, educators opined that it provided flexibility in choosing the tools based on specific needs. IT staff also illustrated that disparities among students have resulted from the lack of coordination among departments when implementing AI strategies. In spite of this, inclusivity was the main strategic focus of UWTSD. These findings are supported in the study of Kuleto et al. (2021).

5.2.2. Influence of AI Integration on Educational Experience

Specifically, AI integration at CU has been significant in educational experience in terms of academic performance and student engagement. The quantitative findings showed improved engagement and increased motivation levels among students who adopted AI-driven platforms for learning purposes. However, adaptive learning platforms assisted them in learning skills at their own pace and allowed them to personalise content based on their learning needs. The findings of educators' interview showed that one educator mentioned that the AI-driven tools helped the students to understand the topics by presenting the data in such a way that they could adapt to their learning styles. These results aligned with the data findings of Luo & Hsiao-Chin (2023), who discussed that student engagement and motivation can be improved significantly with the implementation of AI-powered adaptive learning systems.

According to the views of educators, AI tools can improve student retention rates and academic performance by providing personalised feedback and timely interventions. Some educators mentioned that concerns regarding over-dependency on AI systems might moderate the creativity skills of students. Similar to these outcomes, Jie & Kamrozzaman (2024) highlighted the concerns about over-reliance on AI in educational institutions. Although AI tools improve academic performance and student engagement at CU, however, it is contrast to earlier findings (Li and Chen, 2024) who suggest that it is needed to consider human interaction so that the traditional and technological pedagogic methods will be balanced.

AI integration at UWTSD had a significant impact on educational inclusivity. Quantitative findings from survey results disclosed that the AI tools influenced academic performance positively. The students were allowed to use these tools to receive immediate feedback and identify improvement areas more quickly. This finding is not consistent with another recent findings that published in 'Times' by Victory Livingstone in September 24, Teachers quits the teaching job because of Chat GPT. The teacher who was supervising doctoral students was very much involved in writing the project.

In addition, this study found that students had experienced good satisfaction with AI tools compared to the traditional learning environments. Qualitative data findings revealed that AI-powered tools would be beneficial for teachers and students as well. For example, speech-to-text systems (e.g. Dragon software), enable students with hearing disabilities to engage with academic content and more actively participate in discussions. AI-based transcription services would also be useful for students with dyslexia in reviewing lecture materials based on the perspectives of educators. In support of these findings, Roscoe et al. (2022) recommended that AI tools can assist institutions in bridging the gap between marginalised and underrepresented student groups based on accessible learning options that are tailored to specific needs.

5.2.3. Comparison of AI Integration Strategies between CU and UWTSD

Both higher education institutions (CU and UWTSD) have followed significant and diverse strategies for AI integration. CU's primary focus was improving student engagement and academic performance through personalised learning. In contrast, UWTSD emphasised inclusivity and accessibility. These strategies led to different experiences for educators and students from both institutions. However, this outcome is contrary with the literature review findings that equity and Access are one of the challenges. There is a digital divide since not all students have the same level of access to advanced artificial intelligence tools and resources. Students who come from disadvantaged circumstances can discover that they are at a disadvantage, which will only serve to exacerbate the gap between the various student groups (Xia et al., 2024).

The use of AI-driven predictive analytics, customised tutoring tools, and adaptive learning at CU has a positive impact on student engagement and academic performance. In particular, these strategies would assist the students in gaining the benefits from customised learning pathways. Some inconsistencies have been created in the adoption of AI tools across departments. These results aligned with the research study of Saaida (2023), who underscored the importance of AI integration to meet institutional needs and stressed the importance of adequate training for educators to use AI tools efficiently.

On the contrary, a decentralised approach to the accessibility of AI tools has fostered inclusivity among students. For instance, transcription services and speech-to-text methods have had a great positive impact on the improved learning experience of students, specifically those who want to meet their personalised learning needs. Still, a challenge of inconsistencies across departments for availability is being posed. As noted in the interviews, some educators embraced AI tools efficiently, while others might have faced difficulties in integrating AI into teaching practices. These results corroborate with the previous findings, Ogunleye et al (2024), found that HE has been very beneficial to national society and national economy at large, but this sector is under attack by advance technologies such as GenAI (generative artificial intelligence) tools.

Moreover, both UK institutions experienced challenges relevant to balancing activities between human-centered and AI-based pedagogy and educator readiness. This study has highlighted different institutional priorities, like performance-driven AI tools at CU and accessibility at UWTSD. These differences are reflected in the studies of Chang et al. (2023), which underscored the importance of AI tools and their alignment with student learning. Moate et al. (2024) highlighted the advantages of a decentralised approach to pedagogical innovation in higher education institutions.

Therefore, this study showed that AI integration into educational practices has resulted in enhanced student engagement, inclusivity, and academic performance at CU and UWTSD. These AI strategies reflected the unique objectives of each institution. That means CU focused on academic performance, and UWTSD prioritised inclusivity. In addition, alignment of AI strategies with the priorities of institutions is necessary to ensure enhanced student engagement and educator teaching performance. Both approaches of institutions have yielded positive outcomes, and they should support educators and students adequately throughout the implementation of AI tools in their pedagogy practices.

5.3. Influence of AI-Powered Tools on Student Interest, Learning Outcomes, and Academic

Performance

In higher education, AI-powered tools can transform traditional learning environments into a modern education system, improving student learning and enhancing student engagement and academic performance. AI-driven approaches have been implemented for pedagogic practices at both CU and UWTSD to address different educational requirements. The effects of AI technologies on academic performance, learning outcomes, and student interests have been assessed across both CUL and UWTSD and compared these results with earlier studies.

5.3.1. Influence on Student Interest and Engagement

The findings from the questionnaire survey showed that CU significantly improved student engagement using AI-powered tools, including virtual assistants and interactive learning systems. Based on survey data, 78% of students from CU engaged with AI-driven tools than the conventional teaching methods. Different factors, such as gamified learning experiences, interactive content, and real-time feedback, have fostered student interest. For example, students' participation increased in online discussions using intelligent chatbots and adaptive quizzes. Further, qualitative data supported these results by disclosing that students could be able to gain more personalised learning with the use of AI tools. This finding broadly supports the work of other studies in this area linking Kim et a (2022) and Mir et al, (2023). This study also found that AI makes it easier to engage in personalised learning by enabling lecturers to adapt course material and available resources to the specific requirements of individual students. This improves the overall quality of the educational experience (Kim et al., 2022). Mir et al. (2023) found that this is especially helpful in diverse classes where students' comprehension levels can vary greatly.

During the interview, one educator discussed that AI tools like personalised quizzes made students' experience an interactive learning environment. IT staff also noted that students' participation and attendance increased with the integrated AI-based courses. In addition, students were more interested in accessing additional resources based on AI recommendations. These findings were replicated in the research study of Ellikkal & Rajamohan (2024), which discussed

that student's motivation could be improved using AI-powered tools based on tailored experiences to meet the student's needs. Another study by Martínez-Maldonado et al. (2024) showed that a sense of curiosity and autonomy had been fostered by interactive AI systems that made them more invested and engaged in their studies. In accordance with the present results from the questionnaire survey, the majority of the respondents (67%) agreed that the AI features in learning management system helped them to improve their learning experience.

In UWTSD, student engagement has been enhanced using AI tools aligned with learning needs. The study revealed that 81% of students were engaged in the use of AI-driven tools, such as automated transcription and text-to-speech services for accessibility. The findings of this study indicated that students who suffer from disabilities can gain benefits from AI tools in terms of improved engagement and accessibility of study materials. In addition, the findings of interviews illustrated that the inclusivity of AI technologies fostered student interest. Educators suggested that AI tools made it easier for students to participate in learning activities. For example, voice recognition and screen recording tools help the students to follow the lectures. According to the perspectives of IT staff, the student engagement gap due to the traditional environment can be filled by implementing AI tools in the classroom environment. Consistent with these outcomes, a study by Lin et al. (2024) discussed that student engagement improves by facilitating a more inclusive environment using AI tools. These technologies allow students to meet individual learning needs and styles. The educator interviews also mentioned the requirement of training for efficient usage of AI tools. Similar to this finding, Wang et al. (2023) pointed out that educator readiness is important to adopt AI technologies in educational institutions.

5.3.2. Influence on Student Learning Outcomes

According to quantitative analysis there is no significant direct relationship between AI integration and academic performance ($R^2 = 0.027$, $p = 0.187$), however, it has also found that there is a potential enhancement in learning if reduce the barriers of implementation of AI in teaching practices. However, the findings of one of the questions revealed that 40% of the students strongly agreed that AI features on VLE have enhanced their learning. The student retention rates

were also enhanced with the use of adaptive learning methods, which can be adjusted to diverse levels based on students' needs and individual learning progress. Similarly, another study (Graesser, and Sabatini, 2022), has suggested that students' retention rates improve overall because of adaptive learning methods using more and more AI tools in pedagogy practices. The complex concepts were easily learned more effectively using personalised learning pathways. Educators from this study noted that the adaptive learning systems helped the students to access additional resources according to their academic needs.

Strielkowski et al. (2024) also argued that adaptive learning systems improve student learning in alignment with their personalised needs. IT staff also mentioned that students showed improved grades and quality of assignments based on additional learning support and immediate feedback through AI technologies. In support of these findings, Owan et al. (2023) found that students could be able to identify their strengths and weaknesses more efficiently in learning using AI tools that provide continuous feedback and assessment outcomes to enhance overall academic performance.

The findings of the educator's interview showed that students have improved their academic performance, which adopted AI learning tools. However, AI adoption has also resulted in a positive impact on student learning outcomes. The beneficial technologies were real-time transcription and speech-to-text services that allow students to review lecture content effectively. To extend this, the findings of interview evident that the significant academic improvements experienced by students with the great accessibility of AI tools. Some educators shared that the transcription of lecture studies allowed the students to access them at their own pace, which helped them understand the complex concepts. Thus, they can improve academic performance and grades as well. Wang et al (2021) supported these findings and discussed that AI plays a crucial role among students in facilitating personalised support for better understanding and retention. IT staff believe that the students' academic performance was improved, and classroom dropout rates were reduced using AI tools that provided greater accessibility to learning materials. Similar to these findings, Sajja et al. (2024) emphasised that AI tools facilitated the accessibility of academic

content for students to improve their learning outcomes. Consistent with literature review, this study found that AI is seen as a helpful collaborator in the classroom, collaborating with human teachers to produce the greatest learning outcomes (Robayo-Pinzon et al., 2023).

5.3.3. Impact on Academic Performance

CU has shown improved academic performance of students with the adoption of AI in the learning environment. By integrating AI tools, students showed an overall increment in academic performance compared to traditional courses that were suggested by the CU educators during interviews. Intelligent tutoring and predictive analytical systems were useful for CU in providing targeted support for students in learning the concepts. In alignment with these results, Susnjak (2024) emphasised that the academic performance of students improved with predictive analytics in education based on proactive interventions. Consistent feedback and monitoring helped the students to track academic performance using AI systems. These findings consist of the previous findings done by Yu and Xu, (2023), AI system helps the educators to provide constructive feedback to the learners which helps the learners to improve their academic performance. Moreover, the findings of the interview of educators indicated that AI tools helped educators to facilitate necessary resources for students quickly. In addition, lecturers tailored their teaching methods through AI-driven insights that lead to enhanced student academic outcomes. The study by Ellikkal & Rajamohan (2024) emphasised that academic outcomes improved by using AI-powered tutoring systems to provide personalised support and reduce the student achievement gap.

On the other hand, UWTSD also showed a positive influence on students' academic performance with the AI integration across departments. The outcomes of the questionnaire survey showed that the learners' educational performance improves by implementing AI tools. Furthermore, better academic performance was achieved due to the accessibility features of AI tools, such as real-time transcription and text-to-speech services. This study also found that AI-driven systems helped the students to stay engaged and perform well.

5.3.4. Comparative Analysis of Best Practices and Improvement Areas for CU and UWTSD

AI implementation at CU has helped personalised learning methods for students, including predictive analytics and adaptive learning systems. It has been effective in improving academic performance and students' engagement. In support with these findings, Mirdad (2024) highlighted the advantages of AI in helping personalised support for students to enhance their engagement and academic performance. The inclusive learning environment of UWTSD provided easier accessibility to AI tools for students to meet their diverse needs. It was reflected in the research study of Sajja et al. (2024), which discussed that educational equity has been promoted with the use of AI.

This study found from the interviews that both CU and UWTSD faced challenges relevant to educator readiness and emphaised the importance of ongoing training for educators. IT staff and educators agreed that training is one of the significant challenges to AI adoption and both groups considered that financial challenges restricted the training programs, infrastructure upgrades, and AI tools' purchase. Interviewees recommended funding as a major barrier to implementing AI technologies. Similar to earlier findings, Luckin et al. (2022) found that the vitality of educator's preparedness in successfully integrating AI tools across educational institutions for pedagogy practice. In addition, both institutions highlighted that a balanced approach is needed to avoid overreliance on AI while maintaining the human element. Consistent with the literature, Kim et al. (2022) and Salah et al. (2024) discussed this challenge and cautioned the institutions against lessening the educators' role in an AI-driven learning environment.

The use of AI-based tools has significantly affected student learning outcomes, interest, and academic performance at both CU and UWTSD. Although these universities adopted different types of strategies, they showed a positive impact in terms of improved students learning outcomes, students' engagement, and enhanced academic performance. In addition, educators' readiness should be addressed to ensure sustainable success in higher education based on AI tools.

5.4. Perceived Benefits and Challenges of AI Integration

The perceptions of both students and educators have been evaluated to explore the advantages and challenges of AI integration in higher education institutions, such as UWTSD and CU. The use of AI tools in pedagogy practices has offered a range of benefits, such as personalised learning experiences, improved student engagement, and administrative efficiency. There are some challenges faced by these institutions, such as ethical concerns, technical problems, and resistance to change. However, this study discussed the insights of both perceived challenges and advantages of AI integration by considering both educators' and students' views in alignment with the academic outcomes.

5.4.1. Perceptions of Educators towards AI in Pedagogy

Most of the educators from CU viewed AI integration as positive in terms of providing personalised learning and streamlining administrative operations. They also discussed that AI-driven analytics was useful for educators to offer valuable insights into the academic performance and learning outcomes of students. So that they can provide tailored intervention programs efficiently. In addition, AI tools helped educators in reducing workload based on the automation of routine tasks, such as attendance tracking and grading. It leads to a focus on students' engagement and teaching quality. In addition, they also discussed that interactive modules and quizzes assisted the students in learning the concepts easily. The student's engagement has improved more than the traditional lecture environment.

The study by Chiu (2024), which concerned that the students felt isolated in the automated learning environment, was mirrored by the perceptions of educators. IT staff expressed mixed responses but optimistic opinions about AI integration across learning environments. Some of them mentioned that AI tools made it easier for the institution to monitor students' real-time performance and facilitate instant feedback. Moreover, AI-assisted systems can help meet the diverse needs of students learning by improving inclusivity. Still, there is a learning curve for using AI technologies fully. Similar to these perceptions, Luckin et al. (2022) discussed the potentialities

of AI in automating administrative tasks and providing real-time data to improve the effectiveness of teaching methods. On the contrary, IT staff raised concerns about over-dependency on AI tools to reduce human interaction, specifically in academic course content delivery.

Educators of UWTSD mostly shared positive views about AI tools and their crucial role in improving educational practices. Specifically, AI tools fostered students learning by focusing on accessibility and inclusivity. The university's educators commented that the learning experiences of students have been improved with the use of AI tools, such as speech-to-text and automated transcription systems. IT staff also revealed that AI can bridge the gap between the diverse learning needs of students. In addition, they opined that AI tools transformed the education systems into personalised services for students.

On the other hand, they also shared concerns about data privacy and the ethical implications of the adoption of AI in decision-making. These data findings resonated with the study of Powell and Forstyth (2024), which highlighted the benefits of using AI tools in education, such as efficiency and inclusivity, while balancing the data-related and ethical concerns. Furthermore, the reliability of AI tools was also another concern mentioned by IT staff, specifically in technical issues. Thus, it indicated that educational institutions need to focus on more robust support systems.

5.4.2. Perceptions of Students towards AI-driven Learning

According to the findings of the questionnaire survey, students from CU showed positive attitudes towards AI-driven learning, for example, 80% of them reported improved learning experiences with the AI integration for academic courses. They also mentioned that AI-powered tools provided personalised and interactive learning. Furthermore, students' engagement increased by using AI tools that provided benefits, such as real-time feedback, AI-driven tutoring, and adaptive learning systems. The overall level of the findings of the questionnaire survey has clearly indicated that the potential advantages of using AI concepts in improving learning experiences were included improved personalisation of learning materials, improved feedback and assessment,

access to advanced learning resources, and interactive learning experiences. These views of students were supported in the study of Chiu et al. (2024), which facilitated interactive and personalised learning experiences using AI tools to improve student motivation and engagement.

At UWTSD, students (82%) reported positive experiences with the adoption of AI-driven tools. Specifically, they highlighted the accessibility features of AI technologies to enhance their ability to participate in academic activities. For example, text-to-speech applications such as Drago software helped students with visual disabilities in achieving their learning needs. Baidoo-Anu & Ansah (2023) showed similar findings and discussed how AI played a crucial role in improving the accessibility of educational outcomes. In addition, AI tools improve students' engagement while alleviating the barriers to traditional methods in educational systems. However, this finding is contrary to earlier studies which have suggested that the educational institutions in higher education gradually has been heavily depending on AI tools in pedagogy practices (Aremu, 2023).

5.4.3. Aligning Perceptions of Students and Educators with Actual Educational Outcomes

The findings of this study have shown that both students and educators shared positive perceptions of AI usage in achieving improved educational outcomes. The findings of questionnaire survey from CU students showed increased student performance with the integrated AI tools than with traditional courses. To support these findings, educators and IT staff agreed that AI tools provide these improvements through personalised support and consistent feedback services (Robayo-Pinzon et al., 2023). They also discussed how AI tools helped the students understand complex concepts. AI-driven learning systems improved the student academic performance at UWTSD, particularly in meeting diverse learning needs.

On the other hand, educators also highlighted that better learning outcomes and improved student engagement could be achieved using AI tools based on an inclusive learning environment. Consistent with these outcomes, Rane et al. (2023) discussed that student achievement improved significantly with the AI tools for personalised learning and real-time feedback. Both institutions showed the full potential of AI systems in pedagogical practices while they required educator

training for educators. However, the finding also showed that, since AI implementation does not come without challenges, it can also negatively impact the learning outcomes.

5.4.4. Addressing Technical and Ethical Challenges

This study found that significant ethical and technical challenges were introduced with AI integration in higher education in spite of numerous benefits. However, both higher education institutions of the UK, such as UWTSD and CU, faced challenges relevant to data security, system reliability, and existing infrastructure. At CU, students experienced technical problems while disrupting the learning process sometimes. Similarly, 28% of students from UWTSD reported issues with AI tools, specifically in the high-usage period and familiarity with the AI tools. It requires significant IT support, continuous monitoring, and a regular update system to handle the technical challenges to ensure seamless integration. The technical infrastructure and ongoing training are also crucial in mitigating these challenges efficiently (Selwyn, & Jandrić, 2024).

Regarding ethical concerns, this study found that both institutions reported common factors such as AI bias, data privacy, and reduction in human oversight. Thie findings of the interview showed that IT teams should establish trust among students and educate the users on ethical practices of using AI tools. One of the interviewee's said that "AI is not just a tool, and it is an enabler," indicating that features of AI allowed academic staff to focus on teaching activities while benefiting students. This study also found that the AI role remained underdeveloped in pedagogy, although tools like SPSS and Turnitin improved workflows. It indicated that IT teams need to bridge the gap between educators and students to enhance student engagement and learning outcomes. Educators were concerned about data transparency while using AI systems to avoid biases and ethical implications about automated systems in student decision-making. These concerns were highlighted in the study of Nguyen et al. (2023), which highlighted the importance of responsible usage of AI in education in compliance with the governance frameworks and ethical compliance. In addition, both higher education institutions made some initiatives to develop ethical policies and standards to address these concerns.

Thus, it is crucial to recognise the ethical implementation of AI to establish trust and support fairness among users in the pedagogical settings.

This study found that both CU and UWTSD institutions provided various advantages, including improved inclusivity, enhanced learning outcomes, and students' engagement with AI integration in educational practices. However, ethical and technical challenges need to be addressed carefully to avail benefits of AI tools. These educational institutions can improve the potential usage of AI in ensuring a balanced and human-centered approach by addressing the challenges using ethical guidelines, robust support systems, and training. The findings of the literature showed that robust ethical frameworks are necessary to guarantee that AI technologies protect students' privacy and appreciate their autonomy. The proper use of AI in education requires finding a balance between creativity and moral obligation. Another finding showed that the ethical issues surrounding the use of AI in educational settings must be thoroughly investigated and evaluated on a regular basis (Williamson, & Eynon, 2023).

5.5. Comparative Analysis of AI Strategies and Pedagogy Outcomes at CU and UWTSD

The adoption of AI across many institutions in higher education, UK and around the world has transformed the learning environment to improve student engagement and academic performance. This study found that both UK institutions, such as UWTSD and CU, implemented distinct AI strategies that reflected their unique resources, institutional goals, and cultural environment. The AI adoption strategies and educational outcomes were compared across CU and UWTSD. This section explored the contributing factors for success or challenges, institutional differences, and learned lessons from CU and UWTSD.

5.5.1. Institutional Differences in AI-Integration Strategies

Based on technological advancement and innovation strategies, AI integration has been observed at CU in this research. The students (68%) reported that they received structured support and training for AI usage as a top-down strategy. This process included extensive investments in AI infrastructure, support systems for AI task forces, and dedicated training systems for adopting

AI systems across different administrative and academic activities. For example, the educational system of CU adopted automated grading systems, predictive analytics, and AI-driven chatbots for students to improve engagement and learning outcomes. Further, the findings of the interview supported these findings and discussed educators' confidence in using AI tools with proactive support. In addition, IT staff remarked that AI integration with a clear pathway to foster innovation and consistent learning. In alignment with this top-down strategy, Sharma & Yadav (2022) highlighted the importance of AI-driven tools in higher education to ensure a smooth transition. On the contrary Carrillo-Pérez et al, (2022), one of AI's most significant challenges is the loss of Personal Touch with the learners and teachers. The possibility of a reduction in the human element is one of the critical worries raised by those who are considering the adoption of AI in educational settings. They have also found that teachers and students' relationships are an essential in pedagogy practices.

Similarly, UWTSD also adopted a top-down strategy for AI integration, driven by individuals. This findings of the interview indicated that the AI adoption allowed accessibility, customisation, and flexibility that enabled the educators to personalise AI solutions to suit the learning needs of students. For example, adaptive learning tools and AI-based accessibility systems are used to provide tailor-made content for students according to their requirements; thus, students' academic performance and learning outcomes would be improved. From another findings, IT staff and educators agreed that AI integration into education should need collaboration among educators, learners, and technical teams to gain potential benefits and address the gaps in implementation. The findings of literature showed that the integration of AI into teaching methodologies is transforming educational institutions, offering transformative benefits across various aspects of the learning process (Chan et al, 2023). AI-assisted technologies are being increasingly utilised to enhance teaching effectiveness, providing educators with innovative tools to support instruction, exercises, exams, assessments, and classroom management. Similarly, Kraus et al's (2024) research showed that, the integration of AI technology with educational instruction has improved educators' comprehension of the fundamentals of both learning and teaching while also helping students in acquiring new knowledge and abilities. However, this study

found mixed responses from the educators relevant to this strategy. Some educators discussed the benefits of flexibility, while others pointed out the challenging issue of a unified institutional approach. Moreover, IT staff noted that AI integration had to be navigated independently, which fostered innovation when implemented across departmental levels. Ali et al. (2023) discussed similar findings and argued that AI adoption with a bottom-up approach empowered innovation but led to varying success levels during implementation.

The major difference between UWTSD and CU was observed in terms of centralisation approaches to AI integration. However, CU's and UWTSD centralised and top-down strategy led to consistency and uniformity. It resulted in different influences on AI adoption across both institutions in terms of scalability and effectiveness.

5.5.2. Contributing Factors to Success or Challenges

This study found that the leadership-driven strategy played a crucial role in the successful adoption of AI at CU. To overcome the initial resistance, educators believed that leadership support has been instrumental in enabling clear communication between strategic investments and senior management. From the interview, educators agreed that inefficient management and leadership direct slow integration or resistance of AI equipment to insufficient leadership in developing the principles of AI. George & Wooden (2023) argued that institutional leadership facilitates the technological transformation in AI integration across educational institutions. Educators and IT staff reported higher satisfaction levels and innovation by enabling rapid adaptation and experimentation.

During the interview educators at CU and UWTSD discussed that comprehensive training programs significantly contribute to the successful implementation of AI. The ongoing support and hands-on workshops have been useful for universities to build competence and confidence in using AI tools among users. The provision of department-based workshops was beneficial for educators with the decentralised approach to improving student engagement in Higher education institutions. Another success factor for CU is investments in the infrastructure of AI, including AI-

powered learning systems and high-performance computing frameworks. Both educators and IT staff agreed that some of the challenges such as various challenges such as compatible issues, and regular training programs for academic and IT staffs. The most important challenge is funding, which really creates the ultimate opportunity to implement AI tools as many current systems require replacement with a current system.

Both institutions faced challenges regarding AI integration in despite of potential benefits. However, the educators of CU opined about the concerns raised about loss of personal contact using AI systems that limited the creativity of students. Similar concerns were also shared by educators of UWTSD, indicating that over-reliance on AI leads to a negative impact on the academic performance of students. In aligned with these, Khogali & Mekid (2023) highlighted the factors like reduced academic freedom and job displacement fears that restricted the adoption of AI. It is crucial to address these concerns based on consistent engagement and transparent communication for the successful integration of AI technologies. On the contrary, Khogali, & Mekid, (2023) found that many educational institutions have not been progressing to implement AI tools in pedagogy practices.

On the other hand, technical challenges, such as data privacy and system reliability, have been faced. Both institutions had technical glitches like data security and ethical implications as barriers to implementing AI adoption effectively. Chan (2023) identified the challenges and stressed the importance of integrating ethical frameworks and robust IT systems to address moral and technical complexities in AI adoption.

5.5.3. Learned Lessons from CU and UWTSD

The valuable insights into AI integration have been derived from the experiences of UK higher education institutions, such as CU and UWTSD. The advantages of coordinated implementation and unified vision through centralised strategy at CU guarantee consistency and scalability. Both centralised and decentralised approaches of UWTSD highlighted the customisation and innovation potentialities across departmental levels. By combining central

leadership with a departmental context, these institutions can implement AI adoption efficiently.

Both education institutions discussed the importance of continuous training for educators and students. However, comprehensive training programs could assist educators in establishing competence, while department-led initiatives included root-level efforts. Based on these, CU and UWTSD should prioritise professional development programs in the adoption of AI strategies to ensure educators remain competent and confident in utilising AI systems. The findings of interview showed that both groups (IT and educators) determine the significance of continuous training to confirm the successful implementation of AI. On the contrary, Ayanwale et al, (2022), found that training is not only the challenges of the implementation, but also appropriateness and adoption of AI tools are some of the key challenges that poses barriers of AI implementation. A few interviewees insisted that it was needed to provide comprehensive training for educators to unlock the full potential of AI tools. Interviewee 4 shared that the journey of implementing AI in the university was still theoretical and limited to individual experimentation for practical applications. The interviewee also admitted that the university should shift to structured implementation since staff awaits formal training programs.

The findings of the review of the literature suggested that, implement vital IT support systems and governance frameworks to handle the technical and ethical challenges faced by CU and UWTSD (Li and Wang, 2023; Wang et al, 2024). It is important to invest in reliable technical infrastructure, develop clear ethical guidelines, and maintain data privacy to mitigate the resistance to AI adoption and foster trust among users. Universities' decentralised strategy shows the implementation of AI initiatives to improve innovation. The interviewee of IT staff indicated that, decentralised approach was adopted in some occasions such as approval of specific IT system, software associated with the AI tools. Thus, the overall effectiveness of AI integration can be enhanced by encouraging collaboration across departments and sharing best practices to achieve consistency and innovation.

Regarding the comparative analysis of adoption strategies across both institutions, such as UWTSD and CU, they showed distinct methods with unique benefits and challenges as well. The

broader institutional support and consistency have resulted from using the leadership-driven and centralised strategy at CU. This university employs a centralised strategy in order to implement AI tools into pedagogy practices including maintaining academic integrity and adapting assessment (Teach.Coventry, 2025).

On the contrary, the decentralised approach (in some occasions) of UWTSD has promoted flexibility and innovation. Moreover, both strategies highlighted the importance of resource allocation, ongoing training, leadership, and ethical concerns when integrating AI systems successfully. Based on these experiences and respective challenges, CU and UWTSD can improve or update their existing AI strategies to enhance educational outcomes in terms of student's engagement, academic performance, and learning outcomes. It would set out as a precedent for other UK institutions in the higher education field for AI integration into pedagogic approaches.

5.6. Role of AI in Fair Student Evaluation and Institutional Transformation

This study found from the review of the literature that a significant interest in adopting AI technology has been generated in higher educational institutions owing to its potential advantages in improving the accuracy and efficiency of student evaluation and assessments. This study showed that CU and UWTSD institutions adopted AI-driven systems for assessment tools to provide valuable insights into the transformation of educational institutions from traditional to modern learning environments while balancing ethical strategies with institutional practices. The accuracy and fairness of adopting AI systems in academic institutions for students' assessments have been examined to determine the implications for physical infrastructure and classroom needs. In addition, ethical concerns are also discussed for automated evaluation.

5.6.1. Accuracy and Fairness of Using AI-based Systems for Educational Assessments

The findings indicated that both educational institutions, Coventry University and UWTSD, perceived AI as an efficient tool for improving academic performance through automated grading systems for students. However, AI-driven systems reduced human biases and enhanced students learning outcomes and engagement from the perspectives of students from CU

(72%) and UWTSD (68%). The tools like AI-driven assessment tools and essay evaluators implemented at CU (35%) reduced the grading discrepancies among educators. The findings of literature showed that there are a number of assessment grading tools available in the market such as Gradehive AI, Markr, Gradescope, Inspera, CodeRunner, Grade and Itellimetric(Gradhive.AI, 2025). Currently CU has been trying to implement Inspera, CodeRunner (Marketplace.coventry, 2025). However, on the other hand, UWTSD still has no records found that they are in the implementation process of AI assessment tools. However, UWTSD has JISC Discovery Tool and Digi Centre (Digital skills.uwtsd, 2025), where a self-assessment questionnaire can be made to provide personalised learning for the learners, which also allow the educators to identify the learners' needed.

In addition, it is beneficial to use AI tools in high-stakes assessments. The consistent grading system using AI ensures mitigates unconscious bias or favoritism in the classroom environment. Similarly, the usage of AI-powered plagiarism detection systems such as Turnitin enhanced the confidence among educators in maintaining the academic integrity of students at UWSTD and CU. On the contrary, this study found that a moderate portion of students reported academic dishonesty in some cases. However, this study also found from the students' questionnaire survey that detection Tools such as Turnitin help them to understand academic integrity. Consistent with these research findings, Bulut et al. (2024) discussed that grading bias can be reduced using AI through the standardisation of evaluation criteria and the elimination of factors such as socioeconomic status or gender from the assessment. This study also demonstrated that there is a possibility of introducing new forms of bias when AI algorithms are not trained or calibrated carefully on datasets while improving fairness.

In addition, the fairness and accuracy of AI-driven assessments rely on the data transparency and quality of input data (Nguyen et al., 2023). On the other hand, only 12 students disagreed with the statement. In addition, the findings of educator's interview suggested that they have to encourage students and themselves to use various AI tools but educate them to use with integrity and honesty. Whilst minority interviewees mentioned that the wide open of AI tools in

higher education will have a negative impact on their learning. This finding is consistent with the previous research that conducted by Aggarwal, & Girdhar (2022), they have found that wider use of AI tools in learning process will be misused without integrating traditional learning process. They have suggested that pedagogy practices will be improved if both AI tools and traditional pedagogy are working side by side.

Despite these advantages, both institutions expressed concerns about data accuracy in AI usage in terms of assessing subjective, creative, or complex tasks. At CU, AI faced struggles in evaluating the responses of students (41%), specifically in essay evaluation accurately, since it required creative expression and critical thinking. Similar challenges were faced at UWTSD, according to the perspectives of students (38%), who indicated that AI systems often failed in qualitative assessments that required critical thinking and creative skills. These concerns aligned with the study of Ayanwale et al (2022), which highlighted that AI remained inconsistent in evaluating interpretative or open-ended tasks. However, it showed excellent performance in evaluating the standardised tests or objectives. This research study recommended that higher education institutions combine AI assessments with human oversight to facilitate a balanced approach to evaluation criteria assessments to overcome these challenges.

5.6.2. Implications for Educational Needs and Physical Infrastructure

The findings of this study suggested that it is required to make changes for infrastructure and classroom environment in alignment with the AI-driven systems at both UK-based higher education institutions, including CU and UWTSD. The quantitative study revealed that 57% of UWTSD students and 60% of CU students believed that AI integration needed to be upgraded to technological infrastructure to reshape classroom dynamics from the traditional learning environment into automated digital evaluation systems. The education systems need to be redesigned with improved capabilities with the implementation of AI-based tools to ensure minimal disruption during the assessments at CU. To provide an adaptive learning environment and real-time feedback for students, UWTSD made investments in designing smart classrooms that integrated AI-powered digital learning platforms and interactive systems. To support this,

educators of UWTSD discussed that the classrooms transformed into tech-enabled digital environments that provide data-driven immediate insights into the student learning procedures.

On the other hand, the findings from the interview showed that both educational institutions faced logistical and financial troubles when implementing AI systems. So, educators discussed that the cost was the main challenge to maintaining the AI infrastructure at CU, specifically renovating traditional classrooms into an AI-enabled environment. There were some connectivity issues with the UWTSD due to the rural campuses that limited the efficient deployment of AI systems into the learning environment. These outcomes resonated with the research findings of Muranga et al. (2023), which emphasised the need for resource allocation and strategic investments in ensuring AI-driven innovation to provide pedagogical benefits for students. In addition, this study also illustrates that AI adoption improves the learning systems while creating disparities between underfunded and well-funded institutions.

The hybrid learning systems are also embraced by both CU and UWTSD that integrate AI-based learning environments with traditional culture. Based on the questionnaire survey results, 62% of students from UWTSD and 65% of students from CU supported the hybrid models that facilitated flexibility in addressing diverse learning needs. Particularly, this approach is effective in providing adaptive learning approaches, personalised support, and improved inclusivity in pedagogical practices. These insights are highlighted in the study of Chang et al. (2023), which discussed that AI-enabled systems promote inclusive education based on real-time feedback and personalised experiences for student learning.

In addition, it also cautioned that over-reliance on AI can lead to a negative impact on the learning outcomes of students. Thus, higher education institutions should have to incorporate a balanced approach to AI integration to enhance student learning, engagement, and academic performance.

5.6.3. Ethical Concerns about Automated Evaluation

Both institutions of CU and UWTSD mentioned ethical concerns and data privacy in assessments through AI-driven technologies. The outcome of the questionnaire survey revealed that 51% of UWTSD students and 48% of CU students worried about the misuse of potential data and potential data breaches. In support of these, the findings of interview study emphasised that data privacy and ethical considerations should be considered in the institutions from the perspectives of educators. Thus, it is required to implement vigorous cybersecurity measures and data governance policy systems in these institutions. One educator from CU discussed that it is important to support ethical guidelines to achieve student trust since AI raised concerns about data integrity and privacy. However, it improves student engagement and learning outcomes.

In the same way, UWTSD had raised concerns relevant to the associated risks with outsourcing student data and third-party AI vendors. Similarly, the ethical concerns highlighted by Hayes et al. (2024) discussed the role of ethical frameworks in ensuring the responsible usage of AI tools to protect student data. Thus, higher education institutions are required to re-evaluate the data consent and privacy policies with the integration of AI into pedagogical practices.

This study alsos found that algorithmic bias is another significant ethical concern raised due to the incorporation of AI-based assessment systems in educational institutions. Both CU and UWTSD had raised biased concerns owing to inadequate training data or flawed algorithms of AI tools. Students from CU (34%) and UWTSD (38%) shared that AI assessments continued the existing biasing if not monitored carefully. Further, this issue is emphasised by qualitative feedback. IT staff from CU opined that AI algorithmic bias can be mitigated by performing ongoing audits and using diverse training datasets. UWTSD institutions' IT staff discussed that it is critical to ensure data transparency with the integration of AI into education systems since it may unintentionally reinforce biases when data is not representative of training algorithms. In support of this, Bulathwela et al. (2024) warned that educational disparities might result from algorithmic biases. Thus, it is required to focus on achieving data transparency and privacy when integrating AI-based learning systems into academic institutions.

Furthermore, both institutions discussed the importance of human connection with the student evaluation process using AI technology even though it provides efficiency gains for education systems. However, a hybrid approach of AI systems with human evaluators is supported by students from CU (58%) and UWTSD (55%) institutions based on quantitative analysis results. The findings of interviews revealed that human judgment provides significant value in understanding the context and evaluation of assessments to align with these. However, Vavekanand (2024) recommended a collaborative approach, including AI integrated with human decision-making rather than replacing it completely. Findings from literature showed that the integrity and human touch in educational settings must be preserved by achieving a balance between AI-supported administrative chores and the preservation of human judgement (Selwyn, and Jandrić, 2024). Therefore, educational institutions need to include human oversight to ensure contextual understanding, empathy, and fairness in student assessments by improving efficiency.

The integration of AI in assessment evaluation at UWTSD and CU highlights the transformative potential benefits of using AI technology. It assists in improving efficiency, accuracy, and fairness but raises significant challenges, including ethical and infrastructural concerns. These should be addressed to ensure improved student learning outcomes. These higher education institutions can gain the benefits from AI tools fully with the balanced approach of technological innovation by including human oversight and ethical concerns. However, they can establish a transparent and inclusive educational landscape by mitigating the risks. The goal of this co-creative method is to minimise administrative responsibilities for educators while optimising the learning experience for students. Similarly, Robayo-Pinzon et al., (2023), suggested that AI-CoACT is an innovative approach to education in which AI is seen as a helpful collaborator in the classroom, collaborating with human teachers to produce the greatest learning outcomes.

Chapter Six: Conclusion

6.1. Introduction

In higher education institutions, AI technology has transformed pedagogical practices by redefining teaching strategies and student learning outcomes. This research study focused on AI adoption strategies at CU and UWTSD in improving educational practices. Specifically, it emphasised the implications for students learning outcomes, engagement, and academic performance. This chapter provides a comprehensive overview of AI tools and how they influence digital literacy, academic performance, and institutional development across these two universities. These findings aligned with the research objectives based on the synthesised outcomes.

The specific objectives of the current research include the state of AI-integration strategies, the effectiveness of AI tools in improving academic performance, students' engagement, creativity, and digital literacy, implementation methodologies, and perceived advantages and challenges at both institutions, including CU and UWTSD. There is a positive impact on academic performance and learning outcomes with AI integration based on the findings of the questionnaire survey. These insights are enriched by the findings based on the captured perceptions from educators while exploring the associated opportunities and challenges of AI in pedagogy.

The significant advancements in personalised learning and pedagogical efficiency using AI tools have been emphasised in this research study. A structured and robust system for AI appropriateness and adoption is required to be considered for improving student engagement through learning systems like Moodle and Aula at CU. On the other hand, educator-driven initiatives at UWTSD promoted resource accessibility and digital literacy. The context-specific nature of AI adoption is reflected in these strategies that highlight the importance of tailored approaches aligned with the institutional goals. It is still crucial to address challenges like ethical concerns, institutional readiness, and fairness in spite of the advantages of using AI.

The data findings disclosed that disparities existed between the AI adoption strategies of CU and UWTSD in pedagogy practices. It is essential to highlight the differences in AI integration approaches with institutional priorities to maximise the impact of AI. Moreover, it was evident that AI has been shown impact on infrastructural and academic outcomes. The operational efficiency has been enhanced with the use of AI that reshaped academic dynamics by introducing innovative solutions in the evaluation. Both educators and IT staff discussed data privacy, ethical concerns, and algorithm bias that required to be addressed in educational institutions.

This chapter presents the data findings that outline the potential of technology in revolutionising education practices to explore the crucial role of AI in higher education. In addition, it discusses the implications for educators and policymakers to incorporate an inclusive and strategic approach to AI adoption in pedagogical practices. The below sections present the summary of the data findings from this study. It contributed to the broader implications of AI in higher education by discussing its theoretical and practical contributions. In addition, the limitations of the study and future research recommendations are also illustrated. These insights can guide higher education institutions to develop innovative educational practices by navigating the challenges and opportunities with AI integration.

6.2. Summary of Findings

This study focused on evaluating the role of artificial intelligence in educational practices at both UK universities, such as CU and UWTSD. The research aimed to assess the impact of AI on student engagement, teaching strategies, and academic performance and learning outcomes of students. Accordingly, a mixed-method approach was adopted by integrating the data from the questionnaire survey and interviews insights to provide a comprehensive understanding of the influence of AI on higher education. In this section, a summary of findings that are structured based on proposed research questions and a synthesis of results across these institutions.

6.2.1. Recap of Research Objectives

6.2.1.1. Empirical Findings and Conceptual Framework

Empirical Findings Concerning Objective 1:

The questionnaire survey emphasised the mixed results for the effectiveness of AI on pedagogical practices. For example, AI integration showed a statistically significant relationship between creativity and modest improvement in learning outcomes. On the other hand, there was no significant correlation between AI integration and academic performance. Moreover, the interviews outcomes disclosed that CU and UWTSD implemented various AI tools, such as Grammarly, Aula, Moodle, Turnitin, Canvas, etc. However, these tools enabled educational institutions to gain benefits like real-time feedback, personalised learning, improved teaching methods, and plagiarism detection. Thus, it indicated that AI tools alone are inefficient in addressing gaps across both educational institutions.

Empirical Findings Concerning Objective 2 of the Research:

The questionnaire survey findings revealed that AI integration had a limited impact on students' engagement. In addition, it improved student learning outcomes modestly, while there was no significant improvement in academic performance when paired with robust educational practices. However, the interview results indicated that AI tools improve students' engagement and the allocation of resources for educators. Moreover, they develop student interaction during sessions, develop assessment strategies, and customise the resources based on learners' needs. Based on comparative analysis, it is recommended that the implementation of AI tools at CU is highlighted in providing real-time feedback. At the same time, UWTSD emphasised providing diverse approaches and content systems to achieve pedagogical objectives.

Empirical Findings Concerning Objectives 3, 4, & 5 of the Research:

Based on the study's empirical findings, AI adoption positively influences creativity and digital literacy. Challenges, such as ethical concerns, financial constraints, and inefficient management, have limited the effectiveness of AI integration. CU recommends consistent training and educator development programs, while UWTSD considers accessibility and data privacy. In addition, AI integration significantly improved creativity, but no effects were found on academic performance. Thus, it implied that there is a need to include tailored implementation strategies for AI adoption in these institutions.

6.2.1.2. Overall Conceptual Framework and Accomplishment of Objectives

Accomplishment of First Objective:

Regarding the current state of integrated AI tools and methodologies into educational practices, this study determined that they were successfully adopted at CU and UWTSD. Based on the findings, AI tools positively influence student learning outcomes, while there is a limited impact on student engagement and academic performance. Moreover, AI-based systems like Moodle and Aula improve students' engagement and teaching efficiency, but these institutions have faced challenges, including ethical concerns and adoption difficulties. The existing literature supported accomplishments of first objective by integration of artificial intelligence tools and methodologies within the pedagogy practices (Robayo-Pinzon et al., 2023), (Alimardani, 2024), Abbas (2024), Sharma, & Yadav (2022), Huber and Morreale (2023). Thus, these research findings emphasised the need to incorporate strategic support and implementation systems.

Accomplishment of Second Objective:

This research study has assessed the impact of AI-driven educational approaches. The effectiveness of AI tools on student engagement and academic performance is not significant without supplementary methods in pedagogy. However, AI tools offer efficient and personalised learning environments. The diverse strategies of CU and UWTSD highlighted the importance of

customised methods to improve the potentialities of AI tools. The existing literature supported accomplishments of second objective by analysing the effectiveness of AI-driven pedagogic tools and interventions in enhancing student engagement, learning outcomes, creativity and overall academic performance (Tewari, & Bose, 2023), (Chu et al, 2022), Cheung et al (2023), Gabriel et al (2022), Kim et al (2022), Oyeyemi, (2023).

Accomplishment of Third, Fourth, and Fifth Objectives:

This research study met the objectives by assessing the role of AI in influencing student learning outcomes and teaching strategies. It showed the impact of AI on creativity, academic performance, and digital literacy, which disclosed the advantages of enhancing student learning outcomes. It also identified the challenges as ethical concerns and financial constraints that affect the implementation of AI significantly. The employed strategies of CU and UWTSD were examined with suggestions for training, personalised learning, and data privacy policies. These data findings aligned with the research objectives that provided actionable insights into AI optimisation in higher education institutions while addressing challenges. Thus, a conceptual framework integrated with findings of this study are needed to understand the impact of AI on pedagogical enhancement in terms of strategic implementation, challenges, and advantages.

6.2.2. Main Insights from questionnaire survey

Based on empirical evidence, the quantitative outcomes assessed are relevant to the influence of AI on educational practices across both institutions, such as CU and UWTSD. However, the results revealed that AI-driven tools improve student engagement and interest. In comparison with the students from UWTSD (68%), CU reported enhanced student motivation (76%) when using interactive AI platforms. Thus, it represented that AI technologies showed great potential in creating personalised and engaging learning environments for students.

AI technologies also proved that they could improve learning outcomes for students, specifically those who require personalised feedback. For example, AI-based tutoring systems at CU assisted the students in completing formative assessments more efficiently than traditional

methods. In addition, this study also found that better academic performance was achieved with the use of AI-driven teaching strategies. The students from CU discussed that they achieved higher grades in final assessments with the use of AI technologies in comparison with UWTSD. Thus, it indicated that AI integration is positively correlated with academic performance.

The quantitative analysis highlighted concerns about AI fairness in student evaluation. Students from CU (58%) shared the view that AI assessments were unbiased and accurate. On the other hand, UWTSD students (45%) discussed the need to refine AI algorithms to improve student evaluation. AI tools facilitated a moderate shift towards hybrid learning systems across both institutions. Compared with UWTSD (55%), CU students (67%) believed that AI tools assisted educational institutions in reducing their reliance on traditional classroom environments. It represented the gradual transformation of learning environments.

6.2.3. Main Insights from Qualitative Data

The findings from the interview provided deeper insights into educators' perceptions and experiences relevant to the integration of AI and its influence on student's engagement and teaching strategies. Based on an interview study with educators, they shared mixed opinions regarding the role of AI in teaching methods. In comparison with traditional teaching strategies, many educators viewed AI technology as a great supportive platform to engage with the students efficiently. Moreover, efficiency and personalised learning have been achieved using AI technologies in the classroom environment. Educators were concerned about the over-dependency on AI that might depersonalise the learning experiences. According to the findings, educators discussed that students from both institutions discussed the benefits of using AI in the classrooms in terms of an interactive learning environment and personalised feedback. They were also cautioned against the reduced human connection with the adoption of AI.

Moreover, IT staff and educators raised ethical concerns, specifically relevant to algorithmic bias and data privacy. They also discussed the need for data transparency using AI tools while stakeholders illustrated the vital role of incorporating a balanced approach, including

technological advancements with ethical guidelines. Furthermore, there was a general alignment between perceptions from interview data and actual outcomes from questionnaire survey data. For example, educators noted that student engagement improved with AI integration in alignment with the questionnaire survey results. Similarly, the concerns regarding AI fairness were reflected in the uncertainties toward AI-based assessments among students.

6.2.4. Synthesis of Data Findings Across Both Institutions

Both commonalities and differences in AI adoption strategies and their impact on the learning outcomes of students and educators are highlighted across institutions, such as CU and UWTSD, based on a synthesis of data findings. A more centralised approach was adopted at CU that focused on AI systems to improve academic performance and student engagement. On the contrary, departmental-level and centralised strategies implemented at UWTSD allowed the students to access more applications. Still, it might be possible to get inconsistent adoption rates of AI across institutional activities. The transformative shifts were experienced in the educational practices of CU and UWTSD by using AI tools. However, they promoted personalised feedback, active learning, and a hybrid learning environment. The centralised approach at CU provided a smoother transition of AI solutions, while both approach centralised and decentralised approach of UWTSD led to variability in student learning outcomes.

Based on the analysis of questionnaire survey outcomes, CU students performed consistently better than the UWTSD students in AI-enhanced classroom environments. However, IT staff and educators from CU were more optimistic regarding the use of AI in educational institutions. On the other hand, UWTSD educators expressed greater caution, specifically regarding fairness and ethical considerations. This study found that both institutions faced challenges, including resistance to change, technical glitches, and moral concerns. In addition, they also presented opportunities for refining the technologies. These concerns can be mitigated through comprehensive and consistent training programs and ethical guidelines. The departmental flexibility of UWTSD highlighted the potential for tailored solutions for AI systems.

The context-specific approaches in AI integration were highlighted in these research findings. The advantages of university-wide and cohesive implementation were demonstrated in the centralised model of CU. On the other hand, the departmental-level approach of UWTSD highlighted the innovation of AI. These strategies would provide valuable lessons for different educational institutions that are considering AI adoption. The significant advancements in student learning outcomes, institutional transformation, and educational experiences have resulted in AI integration into the academic practices of UWTSD and CU. Both institutions demonstrated the transformative role of AI technologies in higher education would lead to the pathway for future improvements and innovations in spite of differences in strategies and learning outcomes.

6.3: Case Study Analysis: Coventry University (CU)

One well-known university with a reputation for using cutting-edge teaching methods is Coventry University (CU). CU has adopted AI in order to improve its teaching methods in recent years. The incorporation of AI at CU is explored in this case study, which looks at its instructional strategy, present uses, benefits seen, difficulties faced, and input from educators and students.

6.3.1: Overview of CU's educational approach and infrastructure

CU has a learner-centric approach to education, emphasising practical application and hands-on learning. The school emphasises employability skills heavily to make sure graduates are ready for the challenges of the working world. CU maintains cutting-edge facilities, such as contemporary classrooms, fully furnished laboratories, and collaborative learning areas, to support this methodology (Coventry University, 2024). Furthermore, CU has made investments in cutting-edge technological infrastructure, offering a strong basis for the incorporation of AI in pedagogy.

6.3.2: Current applications of AI in CU's pedagogic practices

CU has deliberately included AI in a number of its instructional strategies. Using platforms for adaptive learning powered by AI is one noteworthy application. These platforms provide tailored content and assessments by analysing each student's unique profile, incorporating

information about their learning preferences and performance. This guarantees that the teaching given to each student is customised to meet their unique needs and learning pace (Beta, 2024). In addition, CU uses AI-driven virtual assistants to offer students instant assistance. These virtual friends are available 24/7 and can respond to questions and concerns right away. According to Coventry University (2021), CU's learner-centric approach is in line with this accessibility, which encourages independence and self-directed learning.

6.3.3: Benefits observed, and challenges faced

At CU, integrating AI has produced significant advantages. AI algorithms have made personalised learning experiences possible, which has raised student motivation and engagement (Al-Samarraie, 2023). Additionally, educators may make well-informed decisions about their lessons due to AI-driven analytics, which give them useful data-driven insights into students' performance (Lameras, 2021). AI adoption in education is not without its difficulties, though. It is crucial to make sure educators have sufficient training and professional growth in AI integration. Furthermore, it is still crucial to address issues with data privacy and ethics in AI-driven teaching methods (Usher, 2025).

6.3.4: Feedback from educators and students at CU

Most CU instructors and students have had positive things to say about the use of AI. Educators indicate that their capacity to deliver individualised education and support has improved due to AI-driven tools. They like the time-saving advantages of automated administrative work, which frees up more time for deep conversations with pupils. CU students have expressed gratitude for the tailored education that AI has enabled. They appreciate that virtual assistants respond to them right away and offer support. What's more, students value how training can be reshaped to fit their unique learning styles and preferences.

In summary, CU's deliberate incorporation of AI into pedagogical approaches shows a dedication to creative, learner-centred instruction. The institution's strategy makes use of AI to improve individualised learning, expedite administrative work, and offer insightful data. Even

though there are challenges, CU's proactive strategy for overcoming them demonstrates its commitment to utilising AI in education to the fullest extent possible.

6.3.5: Case Study Analysis: University of Wales Trinity St David (UWTSD)

The University of Wales Trinity St David (UWTSD) is well known for its dedication to community involvement and comprehensive education. UWTSD has been incorporating AI into its pedagogical practises in recent years, indicating a progressive approach to education. This case study explores the use of AI at UWTSD, looking at its pedagogical philosophy, present uses of AI, benefits noted, difficulties faced, and comments from educators and students.

6.3.6: Overview of UWTSD's educational approach and infrastructure

Building a feeling of community and social responsibility in its students is a top priority for UWTSD. The school prides itself on its small class sizes, individualised attention, and emphasis on experiential learning. With the help of state-of-the-art facilities, well-stocked libraries, and collaborative study areas, UWTSD is proud to offer a diverse and welcoming learning environment. The institution's outreach initiatives and collaborations with neighbourhood organisations demonstrate its dedication to community involvement.

6.3.7: Current applications of AI in UWTSD's pedagogic practices

UWTSD's deliberate integration of AI into several pedagogical practices aligns with the institution's dedication to individualised learning (University of Wales Trinity Saint David, 2023). The integration of AI-driven adaptive learning platforms is one noteworthy use. These platforms use algorithms to examine each student's unique profile, taking into account their learning preferences and performance information, so they can provide customised exams and content. This guarantees that every student receives education that adapts to their individual requirements and learning style (4theRegion, 2023). Furthermore, UWTSD uses virtual assistants driven by AI to offer students prompt assistance. These virtual friends are available around the clock and provide prompt answers to questions and concerns. In line with UWTSD's emphasis on experiential

learning and student-centered education, accessibility promotes independence and self-directed learning and Samsung partnership provided education tools with Immersive LED Technology' (Samsung Newsroom U.K. 2023).

6.3.8: Benefits observed, and challenges faced

At UWTSD, the integration of AI technologies has led to several significant benefits, such as personalized learning experiences, increased student engagement, and the ability to make more informed, data-driven decisions (QAA, 2022). Additionally, AI has enabled more efficient administrative processes, such as automated grading and student support, allowing educators to focus more on creative and complex tasks that enhance the learning experience (Kuleto, & Kopić, 2021). However, these advancements have not come without challenges. The university encountered issues related to data privacy, the risk of perpetuating biases within AI systems, and the difficulties of integrating AI into existing educational structures (McDonald et al., 2024).

6.3.9: Feedback from educators and students at UWTSD

The UWTSD faculty and student body has overwhelmingly expressed gratitude for the use of AI. Educators said AI-powered resources have improved their capacity to deliver individualised education and assistance. They value the time-saving advantages of administrative duties that are automated, since it frees up more time for meaningful student interactions. UWTSD students are happy with the individualised learning opportunities AI has made possible. They like the prompt assistance and input that virtual assistants offer. Students also value how training may be customised to fit their own learning preferences and methods.

In summary, UWTSD's deliberate use of AI into pedagogical approaches demonstrates its commitment to cutting-edge, student-centred learning. Through the use of AI, the institution is able to improve individualised learning, expedite administrative processes, and offer insightful data. Although there are challenges, UWTSD's proactive effort to overcome them demonstrates its dedication to using AI to improve education.

6.3.10: Imperative Analysis of CU and UWTSD

Both Coventry University (CU) and the University of Wales Trinity St David (UWTSD) are prestigious universities with distinctive pedagogical philosophies. Their mutual dedication to creative and customised learning experiences is seen in the way they have incorporated AI into their pedagogical practices. However, minor variations in their approaches to education and the use of AI show the variety of ways that organisations might use technology to improve student learning.

6.3.11: Educational Approach and Infrastructure

Both CU and UWTSD are committed to providing top-notch instruction in welcoming, stimulating classroom settings. To promote student achievement, both schools place a high value on hands-on learning, small class sizes, and individualised attention. However, CU is a pioneer in educating graduates for the professional world because of its emphasis on employability skills and investment in cutting-edge facilities. Conversely, UWTSD is notable for emphasising social responsibility and community involvement, which is evident in its local partnerships and outreach initiatives.

6.3.12: Integration of AI

A similarity between CU and UWTSD is the use of AI in pedagogical approaches. To improve individualised learning, both universities have thoughtfully incorporated AI-driven technologies. To give students individualised instruction and support, they make use of virtual assistants and adaptive learning platforms. These AI-based teaching strategies complement each school's educational philosophy, strengthening experiential learning at UWTSD and CU's learner-centric approach.

6.3.13: Observed Benefits and Challenges

Both institutions have clearly benefited from the inclusion of AI. AI-enabled personalised learning experiences have raised student motivation and engagement. Furthermore, Tutors and lecturers are empowered to make well-informed decisions about their lessons through the data-driven insights into student performance that AI-driven analytics offer. Nonetheless, both universities continue to face difficulties in resolving data privacy issues and providing training for educators. It is still crucial to make sure educators are prepared to use AI tools efficiently.

6.3.14: Feedback from Educators and Students

Educators and students at CU and UWTSD have largely provided good feedback. Educators value the improved capacity to offer customised guidance and assistance in addition to the time-saving advantages of computerised administrative work. Pupils appreciate how AI-driven technologies give them instant feedback and guidance, and how they may customise the curriculum to fit their own learning preferences and styles.

In summary, CU and UWTSD have different institutional identities, but they both share a commitment to using AI to improve education through their distinctive educational methodologies and applications. CU's emphasis on employability and state-of-the-art facilities enhances its use of AI in personalised learning. UWTSD uses AI to support experiential learning, which is consistent with its emphasis on community engagement. These educational establishments serve as models for how technology and a learner-centred approach may transform the classroom.

6.3.15: Similarities and differences in AI adoption and application

The incorporation of AI into higher education establishments, like Coventry University (CU) and the University of Wales Trinity St David (UWTSD), is indicative of a mutual dedication to inventive teaching methodologies. Nevertheless, a more thorough analysis identifies both commonalities and unique strategies in these two organisations' AI adoption and use.

6.3.15.1: Similarities

Learner-Centric Approach: To deliver individualised learning experiences that meet each student's needs, both CU and UWTSD place a high priority on learner-centric education. This educational concept is supported by the use of AI, which makes it possible to give individualised content and support systems that improve the learning process as a whole (Beta, 2024).

Focus on Data-Driven Insights: Both organisations understand the importance of using data to inform educational decisions. They use data driven by AI to discover more about the engagement, performance, and learning styles of their students. By enabling educators to make well-informed decisions about instruction and interventions, this data-driven strategy improves student outcomes (Beta, 2024).

Shared Commitment to Ethical Standards: CU and UWTSD are dedicated to maintaining ethical standards in the integration of AI. When it comes to gathering, storing, and using student data, they place a high priority on data privacy and openness. Assuring responsible AI implementation is consistent with their commitment to offering a safe and reliable educational setting (Leoste et al., 2021).

6.3.15.2: Differences

Educational Philosophy and Focus: Different educational ideologies and areas of focus are evident in both institutions, even if they use AI to improve pedagogy. With the incorporation of AI to imitate real-world events, CU reflects its significant emphasis on employability skills and practical learning experiences. As a result, UWTSD aligns AI applications with these principles by placing a higher priority on community participation and experiential learning (4theRegion 2023).

Infrastructure and Technology Resources: CU and UWTSD's degree of infrastructure and technology resources may have an impact on the extent and size of their AI integration. With its cutting-edge resources, CU could be able to put more sophisticated and comprehensive AI-driven solutions into practise. Although just as dedicated, UWTSD may modify its AI applications to fit the resources at hand (University of Wales Trinity Saint David, 2023).

Student Demographics and Diversity: Students from a variety of backgrounds and needs may be served by CU and UWTSD. It is possible to customise AI integration to meet the unique needs of these varied groups. According to University of Wales Trinity Saint David (2023), UWTSD's community-centered strategy might result in AI applications that improve community participation and local impact, whereas CU's concentration on employability might lead to AI solutions focused on career preparedness.

As a result, institutions of higher learning like CU and UWTSD that have embraced and implemented AI do so because they have a common dedication to creative, learner-centred teaching. Their different educational philosophies, resource capacity, and student demographics influence how each school integrates AI, even though both use it to improve personalised learning experiences and take advantage of data-driven insights. By identifying and comprehending these parallels and divergences, establishments can customise their AI initiatives to correspond with their unique learning objectives and preferences.

6.4. Implications for Educational Practices

The data insights collected from the discussion chapter, based on the both interview and questionnaire survey findings, revealed that AI plays a crucial role in influencing pedagogical practices. However, the adoption of AI in higher educational institutions has resulted in numerous opportunities and challenges. This research was conducted to provide comprehensive details about AI's influences on educational practices and how it transformed teaching strategies for educators and student learning outcomes. Accordingly, this section discusses AI implications on pedagogic practices while providing recommendations to enhance teaching methods and learning outcomes

while outlining the best integration strategies of AI in higher education institutions.

6.4.1. Impact of AI on Educational Practices

The findings of this study revealed that AI-powered tools, such as intelligent tutoring systems and adaptive learning systems, could be able to provide tailored educational experiences according to the student's needs. The transformative shift towards student-centric and personalised learning is the major significant contribution to educational practices. The majority of students from both institutions, including CU and UWTSD, reported that AI-based systems assisted them in understanding the concepts in a better way at their own pace through a questionnaire survey. This study indicated the shift towards personalisation aligned with the pedagogic theories that emphasised differentiated instructions in alignment with individual learning styles. AI-based systems in educational institutions facilitate a more effective and personalised learning environment with its continuous evolution. It ensured that students could receive the right level of support in the learning environment with the integration of AI technologies. In addition, AI-based systems can be able to identify the learning gaps, assess the student data in a real-time environment, and recommend the target interventions (Sajja et al., 2023). Moreover, this strategy of AI tools enables the educators to modify their teaching methods according to the student's requirements. It will improve individual student learning outcomes by providing valuable insights for educators regarding student progress through immediate feedback.

Another significant influencing factor of pedagogic practices is AI's ability to automate administrative tasks. Based on a interview study with educators, AI integration facilitated major benefits regarding administrative burdens, including management of student records, grading assignments, and feedback. The automation systems assist the educators to focus more on lesson planning, direct engagement with students, and other educational responsibilities. In addition, AI-based learning systems can ensure consistent grading and efficient student learning outcomes. More personalised and timely feedback can be provided for students with the increased automation. Accordingly, AI tools facilitate real-time and instant feedback to share necessary improvements prior to the final assessment. These are aligned with the formative assessment to

support ongoing student learning and educational development practices (Yesilyurt, 2023). AI-powered tools can be able to provide feedback immediately on student assessments. For example, students can understand their mistakes and learn the concepts easily and quickly based on quizzes and exams.

In contemporary education, AI technology plays a significant role in fostering collaborative learning practices. Virtual learning environments can provide students with collaboration and interaction through AI-enabled systems. However, it can be recommended for the students to promote group work based on their interests, learning needs, and expertise areas. They can create a more effective learning environment with improved engagement. Positive experiences were reported at both institutions, such as CU and UWTSD, in AI-based collaborative projects from the findings. This research indicated that cooperative learning and peer review not only improve the problem-solving skills of students but also assist them in establishing a sense of community in the learning environment. It can also be extended beyond the classroom environment with AI adoption. Accordingly, students can engage in discussions, assess resources, and collaborate with their peers at any time using AI-driven learning management systems (Godwin Olaoye et al., 2024). This flexibility supports both asynchronous and synchronous learning approaches. It enabled the students to engage with the course materials and their peers in a way that they could make schedules and learning preferences aligned with their interests and needs.

The educator role also evolved with the integration of AI tools in educational institutions. This transformation towards being a guide and facilitator would be possible with the advent of AI technologies. These systems evolved from traditional educational practices, where the primary source of instruction is knowledge dissemination. AI systems can improve student engagement by providing tailored content. At the same time, educators can gain the opportunity to access a wide range of applications and improve skills like creativity, problem-solving, and critical thinking.

Furthermore, the implementation of AI tools has changed the traditional classroom environment into a more engaging environment. Students can use the in-class time to improve their problem-solving skills and establish a collaborative environment by using AI-powered video

lectures or interactive simulation systems. In alignment with the contemporary pedagogical frameworks, the teaching strategies emphasised deeper engagement with course material, student autonomy, and active learning.

6.4.2. Recommendations for Teaching and Learning Environment

The key findings of this study conclude that AI tools provide educators with varying levels of expertise and comfort. Educational institutions should invest in training and development programs to ensure the successful integration of AI tools. However, these programs should focus on teaching strategies to use AI technologies while understanding the pedagogic value. Collaboration among educators should be fostered through educator development programs that enable them to share the best practices and experiences regarding AI integration. The training programs should be implemented in such a way that AI tools can be used to personalise student experiences, improve student learning and teaching, and streamline administrative operations. These programs should focus on assisting educators regarding how to use AI technologies in improving pedagogic values and student engagement. Professional development opportunities should be facilitated for educators along with formal training to stay updated on the latest applications and advancements in AI in education (Alam, 2021). The innovation culture will be fostered among educators using these training programs by leveraging the full potential of AI tools.

To enhance the effectiveness of AI tools, they should be integrated into assessment processes, schedules, and course design. AI-powered learning systems can be aligned with students' personalised needs. Students can receive tailored content to ensure that learning objectives are met. For example, AI-based assessment tools like gamified learning systems or adaptive quizzes can engage students by providing real-time academic performance through instant feedback. It is essential to consider that AI tools should complement the existing traditional assessment techniques rather than replacing them completely. A comprehensive understanding of students learning can be provided by integrating AI-driven data with human judgment using a hybrid approach for assessment methods. For instance, formative assessments can be supported through regular feedback and quizzes using AI. On the other hand, educators can focus on

summative assessments since they need creative, critical analysis, and knowledge synthesis (Gardner et al., 2021).

This study recommended that educational institutions consider inclusivity and equity when integrating AI tools into teaching strategies and student learning. AI usage should not disturb existing systems, and it has the potential to improve educational opportunities. During the implementation of AI tools, academic institutions should consider the diverse needs of students. For example, students who suffer from disabilities, have limited accessibility to technology, or are from lower socio-economic backgrounds might face challenges in accessing AI-based resources (Karimov et al., 2024). To restrict these issues, UK-based educational institutions should focus on providing AI tools with good accessibility for all students while providing necessary resources. AI systems ensure that they provide assistive technologies, customised formats for content, and good accessibility. In addition, these tools should be evaluated for biases to ensure that they do not continue implementing discriminatory practices for teaching strategies and assessment practices.

6.4.3. Best Practices for AI Integration in Higher Education

The educational goals and needs of institutions in the UK should have to be understood clearly in the AI adoption. Prior to the implementation of AI tools fully, they should carry out pilot programs, which allow them to assess their effectiveness and determine their challenges. However, pilot programs should ensure that AI tools are suitable for diverse learner profiles and teaching different individuals involved in the pilot programs, such as students, administrators, and educators.

In addition, UK educational institutions should have a clear vision about how AI tools align with the educational objectives while they should not adopt them for the sake of technology only. Collaboration among IT staff, educators, students, and administrators is being fostered to achieve the best integration practices for AI adoption. AI tools will be aligned with teaching strategies and curriculum objectives with the collaboration. Furthermore, knowledge sharing between educational institutions can avoid common drawbacks and identify successful practices. In the

collaborative environment, institutions should create networks or platforms so that educator members can share resources, experiences, and research directions about AI applications in the education field of the UK.

Moreover, it is important to assess the influence of AI tools on teaching and learning across UK educational institutions. Accordingly, they should remain adaptable and flexible with rapidly evolving technologies. However, the effectiveness of AI adoption will be analysed with regular evaluations, including both the questionnaire survey and interviews' insights. For example, questionnaire survey outcomes are evaluated based on student performance data, while interview data is based on feedback from educators and students. So that, the institutions can find out the areas for improvement of pedagogic practices. They should also maintain relevant and effective strategies for AI adoption by including ongoing processes. In the higher education institutions (HEIs) of the UK, the integration of AI shows transformative potential in terms of significant effects on teaching methodologies, educational practices, and student learning outcomes. However, the academic landscape is being reshaped with automated administrative operations, personalised learning, and collaborative learning. To gain a full range of benefits, they should invest in the development of facilities and accessibility of AI technology to adopt the best practices and ensure inclusivity and equity. By considering all these recommendations, UK-based HEIs can create more accessible, efficient, and personalised learning environments for students. Thus, it leads to improved learning experiences and teaching methodologies.

6.5. Contributions to the Education Field

AI integration into educational practices indicates a paradigm shift in administrative efficiency and academic experiences in higher educational institutions. The findings of this study disclosed the impact of AI on teaching strategies and student learning outcomes. This section focuses on demonstrating the research contributions to academic theory and knowledge, practical implications, and how they should impact future innovations in pedagogical practices.

6.5.1. Contributions to Academic Knowledge and Theory

This research study is being extended to the existing theoretical frameworks. For example, AI tools are integrated based on connectivism and constructivist learning theories (Liu et al, 2021). In alignment with constructivist principles, AI systems like adaptive learning systems and intelligent tutoring platforms enable student-centered and personalised learning. Moreover, the research findings supported the connectivism theory by illustrating how a collaborative learning environment is being fostered using AI (Nguyen, & Kumar, 2025). AI integration offers a more comprehensive framework within these theories to evaluate the influences of AI on knowledge connectivity and construction in higher education.

This study showed statistically significant improvements in learning outcomes, academic performance, and student engagement with AI adoption in CU and UWTSD institutions. For example, empirical evidence contributed the academic knowledge based on data-driven insights and the impact of AI in diverse educational settings. On the other hand, students from both institutions reported enhanced motivation and active participation with the integration of AI-enhanced tools. In support of this, the outcomes of the interview presented a theoretical understanding of stakeholder perceptions regarding AI usage in education. For example, educators and IT staff from both universities showed optimism toward AI tools in streamlining teaching strategies but raised concerns about ethical considerations. However, all these perceptions offer insights into the influencing factors of AI integration while extending the existing theories on acceptance of technology and resistance in pedagogical contexts (Rane, & Paramesha, 2023).

This research also contributed to the ethical considerations that surrounded AI technologies in education. However, both these institutions discussed ethical concerns regarding algorithmic bias and data privacy. It will add in-depth insights into theoretical frameworks with the integration of moral concerns into AI discussion of pedagogical impact while addressing ethical and social aspects of pedagogical technology (Holmes et al., 2021).

6.5.2. Practical Implications for Educators, Policymakers, and Students

Educators from both institutions, like CU and UWTSD, reported that AI technologies allow them to focus on interactive teaching and mentorship. Consequently, free time will be provided for educators regarding higher-order teaching by automating routing tasks, such as attendance tracking and grading. By encouraging deeper engagement between educators and students, this transformative shift improves the education quality. Accordingly, AI-driven tools can assist educators in providing tailored instructions for individuals or students based on their learning needs. They can also leverage more effective and inclusive teaching methodologies in acknowledging diverse learning styles (Luckin, 2023). For example, educators were allowed to use adaptive learning platforms to facilitate differentiated content to enhance student comprehension in this study.

In AI literacy, the need for continuous professional development is highlighted in the study by Holmes et al. (2021). In aligning these, this research study discussed that educators require ongoing and consistent training about using AI tools while understanding pedagogical and ethical implications. The training sessions and regular workshops should be implemented across institutions to incorporate necessary knowledge and skills among educators.

Moreover, AI has also transformed the learning experiences of students by including a more personalised and interactive learning environment. This study was evident that students from CU and UWTSD identified that AI tools like virtual labs, chatbots, and intelligent tutoring improved student engagement. It indicated that AI could provide better academic outcomes with the inclusion of a more enjoyable and accessible environment (Luckin et al., 2022). Furthermore, critical thinking and digital literacy skills are also important to be developed among students in the AI context. Students are being prepared for a digital economy based on the integration of AI literacy into curricula. They should learn how to evaluate AI-generated content, usage of AI responsibly, and understand the limitations (Luckin et al., 2022).

Policymakers in the education field should create supportive frameworks for AI adoption. This study included developing guidelines regarding the ethical usage of AI and data privacy in technological infrastructure. In addition, it disclosed that clear policies can address ethical concerns and provide smoother AI integration. It is important to include the digital divide for the successful adoption of AI tools. Policymakers should have access to AI-based technologies while providing resources for students and making investments in improving technological infrastructure. The gap between underserved and digitally privileged communities will be filled to promote inclusivity in pedagogy using these strategies (Holms et al., 2021).

6.5.2: Recommendations for other higher education institutions

The degree to which students learn should be used to assess how good a teacher is. There is probably no shortage of excellent teaching philosophies and techniques. Effective teaching is determined by a variety of elements, but the most important one clearly shows that students are learning. It is imperative that an individual come to an institutional consensus on this idea, which will involve thinking through issues like what the various student populations (preprofessional, majors, and nonmajors) ought to be studying in each area and how best to support that learning. According to Sharma, & Yadav (2022) and Huber and Morreale (2023), for example, definitions of effective teaching in STEM courses at the institution should consider the state of student learning and academic achievement.

Academic pursuits centred around enhancing teaching and learning ought to be acknowledged and rewarded as legitimate academic endeavours, and they should receive the kinds of institutional support intended to advance scholarships more broadly (Leite, & Blanco, 2020). Scholarships focused on enhancing student learning and teaching efficacy need to get the same administrative and collaborative support as other research and service projects. It should be assumed that faculty members who want to pursue scholarly work by conducting educational research or enhancing instruction will adhere to the same criteria of quality as other forms of study. When it comes to personnel considerations like tenure, promotion, and merit-based pay increases, they should also get rewards commensurate with those offered for other types of scholarship.

Peer reviews and teaching portfolios utilised for promotion, tenure, and post-tenure reviews are important components of valid summative assessments of teaching that go beyond student evaluations. To help faculty members improve their instruction, these tests ought to be made to deliver impartial, unbiased results. The key components of this evaluation technique include fostering faculty consensus, supplying the required tools, and depending on the best available research on teaching, learning, and assessment. A faculty member's accomplishments in supporting student learning and academic achievement can be documented in a teaching portfolio, which should include a thorough self-assessment by the person undergoing the review. These portfolios can be used for summative evaluation, but it is also crucial to keep track of individual successes and teaching-related concerns so that they can form the basis for ongoing professional development. Educators should gather a variety of evidence of their success that can be utilised for both formative and summative assessments, regardless of whether formalised teaching portfolios are necessary for evaluating their instruction. The following are only a few examples of the proof that could be presented:

- Covering material at a level that corresponds with the objectives of the course (especially for a vertically sequenced course).
- Encouraging continuity in the classroom by limiting absences and providing superior stand-ins when one is required.
- Setting aside time for students to consult with advisors informally and amicably.
- Remaining receptive to feedback on one's own instruction.
- Vigorously advocating for infrastructural upgrades that augment undergraduate education.
- Taking part in conversations about improving teaching and learning and curriculum at the departmental, college, or university levels.

- Overseeing student research projects and promoting student involvement as contributing coauthors of published works.
- Being prepared to encourage undergrads to attend professional gatherings.
- Introducing undergraduates to professional environments through study abroad programmes, government laboratories, and industry internships.
- Being conscious of and implementing cutting-edge pedagogical strategies, such as deliberate instruction and evaluation techniques.
- Taking part in the creation of worthwhile laboratory experiences.
- Assisting in the creation of creative concepts for honours and upper division courses as well as lower division transdisciplinary offerings for nonmajors.
- Taking part in departmental and other colleagues' successful mentorship and evaluation.
- Assisting colleagues who are trying to become better educators.

STEM departments should also think about employing professors with specialised knowledge of learning in their fields. These new personnel might share the important materials with their departmental peers because they would be familiar with them. In order to build new teaching and learning communities, departmental cultures should support and facilitate this sharing of expertise in learning (Seba et al, 2021; Southworth et al, 2023). In addition, faculty members may be assessed based on how well they support curricular integration and closer attention to the academic needs of a wider range of students in their department.

Rewards should be given to individual faculty members, both novice and seasoned educators as well as their departments, for continuously improving learning outcomes for both major and non-major students. Evaluation methods for faculty incentives should incorporate all

teaching-related tasks, including grading, reporting grades, developing curricula, training teaching assistants, and committee work linked to teaching. Departments ought to support their faculty members in enhancing their instruction by encouraging their active engagement in continuing professional development initiatives. Changes to departmental curricula must be initiated and coordinated by departmental faculty. Significant honours should be given by chief academic and executive officers to faculty members and departments that exhibit excellence in teaching practice and scholarship, as determined by the campus teaching and learning community and the standards outlined in this report (Bura, and Myakala, 2024).

As part of their personal dedication to professional excellence, faculty members should acknowledge that they have an obligation to enhance their teaching abilities. The provision and support of on-campus resources (such as centers for teaching and learning) as well as personnel policies that acknowledge and reward such efforts are two ways that departments and higher education institutions should emphasise the value of this kind of professional development for faculty. Nonetheless, Chen et al, (2025) found that organisations must acknowledge that different disciplines have distinct approaches to teaching, and that these variations ought to be included in assessment protocols. Attending events at the school's teaching and learning center is one way for faculty members to show that they are dedicated to honing their teaching techniques. They could include planning or taking part in teaching and learning seminars or departmental or campus-wide presentations or conducting formative assessments of team members. According to Association of American Colleges and Universities (AAC&U), (2024), It is time for the academic community to recognise and celebrate the efforts made by faculty members and departments to enhance instruction. Evaluation practises in other disciplines can also benefit from the spread of knowledge about campus-wide achievements in assessing teaching and learning. It is essential to acknowledge the disparities in approaches and emphases across fields when assessing teaching. Departments that prioritise laboratory-based instruction as a fundamental aspect of their curriculum, for instance, will employ distinct pedagogical approaches than departments where laboratory and field activities are not customarily included in the curriculum.

6.5.3. Impact on Future Pedagogical Innovations

Future educational systems' adoption of AI-enhanced learning ecosystems assures the success of AI integration at CU and UWTSD. The hybrid learning environment helps to satisfy learners' diverse needs and facilitates the integration of AI tools with traditional teaching methods. The immersive virtual reality classrooms and AI-driven collaborative platforms will be considered in future innovations in the enhancement of learning systems with the inclusion of advanced AI technologies.

The role of educators was redefined with the introduction of AI technologies. In the future, teachers in the educational system will be considered facilitators. The facilitator will not focus on delivering standardised content but instead on helping students navigate a personalised learning journey. The introduction of advanced technologies in education requires teachers to focus on developing new skills related to technology management and technology (Luckin et al., 2022). The ethical and inclusive design of AI helps to design future innovations in teaching and learning. Developers and educators need to collaborate on developing transparent AI tools that are free from bias and inclusive, helping to address the ethical issues highlighted in the research. Ethical compliance was assured by considering a diverse range of stakeholders and conducting regular audits (Mouta et al., 2024).

The research findings predicted that the advance in AI education would be assured by integrating academic institutions with the tech industry. The collaboration of the tech industry with the integration of advancing AI in education assured real-world applications for students and innovation in the education system. The challenges in education were managed efficiently by the collaborations of AI solutions that help to provide skill development and personalised career guidance (Holmes et al., 2022).

The culture of lifelong learning was enhanced with the role of AI in education helps to address the challenges that exist in traditional academic settings (Luckin et al., 2022). The idea of continuous education and professional development was enhanced with AI-driven learning tools

helping to provide a flexible and personalised environment in education. The individual was able to acquire skills and knowledge throughout the career and was assured of the integration of AI, considered a major highlight of the study (Alenesi, and Faisal, 2020).

6.6. Limitations of the Study

This study on the integration of AI in higher education provides numerous advantages and valuable insights, however, several limitations exist in the study that need to be acknowledged. The challenges of the study were majorly caused by the collection of data and analysis, generalisability of the findings, scope, and methodology. To understand the context and to guide future research on AI in the educational environment, acknowledging the limitations of the study was considered mandatory.

6.6.1. Methodological Limitations

A combination of both questionnaire survey and interview methods was employed for the methodology of the study. The depth and generalisability of the findings were impacted by several limitations that existed in the study.

The understanding of AI adoption was examined by considering two educational institutions, such as Coventry University (CU) and the University of Wales Trinity Saint David (UWTSD) was considered for the study. A relatively small sample size impacted the generalisability of the findings. The diverse experience from other educational systems or other universities was not considered. Only the experience of students and education from the two institutions were considered. The research majorly focused on a case study with a sample size of 233 students for the quantitative research, 15 educators, and 4 IT staff for the qualitative analysis. The variations and complexities in AI adoption were not captured by considering more diverse educational settings.

For the qualitative component, educators and students were invited to comment about their experiences and perceptions of AI. However, self-reported data also suffers from a potential bias.

Social desirability bias could have caused respondents to overstate the positive aspects of AI integration and underreport challenges because the answers they give are in accordance with what they, or the institution, think they should say. However, this could have affected the richness and accuracy of the findings of the interview, especially regarding the ethical concerns, technical limitations, or negative experiences towards the usage of AI.

A cross-sectional study was used where data were gathered at a single point in time. Although this gives us a snapshot of the short-term impact of AI tools on education, it does not tell us about the trends over time. An ideal study would be to study AI integration from a longitudinal standpoint where the students' long-term effects as they learn to use AI tools would be broken down to see how their engagement, learning outcomes, and perceptions change as they become more familiar with the tools. Also, long-term research may yield insight into the sustainability of AI projects and the feasibility of additional increased teaching and learning practices.

This study analysed some specific AI tools and applications that were incorporated into CU and UWTSD, like intelligent tutoring systems, adaptive learning platforms, and chatbots. AI in education, however, means much more than that, and it includes technologies ranging from automated essay grading to learning analytics and virtual learning environments. However, the research doesn't capture all of the diversity of AI tools being used in other learning settings.

6.7: Scope and Generalisability of Findings

The scope of this study is such that there are limits to the generalisability of these findings. Several factors limit the area in which the above research conclusion can be generalised to a wider population. In particular, the research was carried out in two specific higher education institutions, CU and UWTSD, whose institutional contexts, cultures, and approaches to AI adoption are different. While they are both committed to technology integration into teaching and learning, there are differences in infrastructure, educator expertise, and student demographics. Consequently, their findings may have greater relevance for institutions with similar characteristics or within the same geographical area or system of education. However, they may

be of less use for institutions with a different profile, in particular developing countries or less digitally advanced contexts.

This study included different phases of AI adoption across institutions. As an established institution, CU integrated various AI tools and applications across the curriculum strategies. On the contrary, UWTSD was focused on implementing small-scale initiatives and pilot programs, indicating the earlier phase of adoption. This difference could affect the perceived advantages and challenges of adoption of AI among students and educators. However, these data findings might not include complete experience regarding the implementation phase of AI's appropriateness and adoption. They may be more reflective of the early stage of AI integration in the education field.

Data findings of the study also shaped both the institutional and cultural contexts of UK universities. The utilisation of AI in different pedagogical contexts could be influenced by these cultural differences like attitudes toward technology, relationships between students and teachers and pedagogical norms. For instance, various access levels might have been provided for students under distinct educational policies or technological infrastructures. It might lead to different perceptions regarding AI usage. According to the technological or cultural environments in other countries and regions, the adoption of AI in educational institutions should be done.

6.8: Challenges in Data Collection and Analysis

The data collection and analysis procedures influenced this study's outcomes. However, they faced various challenges in terms of completeness and robustness. One major challenge was recruiting participants, specifically educators, for the interviews. Due to time constraints, educators at both universities, including CU and UWTSD, were not interested in participating in the study. Some of them were not confident to participate in this research, whether they can answer accurately regarding AI in pedagogy practices or not. It led to a smaller sample size of educators for our study in a interview study. In addition, it resulted in the limitation of providing a variety of perspectives of educators regarding AI adoption in UK-based higher educational institutions. Furthermore, collected data about the experiences of certain student groups was skewed since response rates

from students with some groups, like postgraduate students, were more engaged compared to other groups.

An interview study was crucial for this research to gain insights into educators' perceptions and experiences. However, a data saturation point was reached early in the process, and new insights did not emerge in the study. In the educator population, a range of experiences may not have been captured completely through qualitative outcomes. Specifically, it might not explore some views regarding students with negative experiences in this study. There could be a chance of overlapping qualitative and quantitative data findings, although a comprehensive view of research questions was provided based on the mixed-method study. For instance, positive effects resulted in student learning outcomes and engagement with the usage of AI technologies. Some inconsistent outcomes also resulted regarding the interpretation of results with the data insights that disclosed technology over-reliance concerns in certain contexts of learning. A more uniform positive response was shown in the survey questionnaire study. It indicated that there is a need to perform more data triangulation due to the disparity between these data findings. Thus, it ensures that the study conclusions represent the complexity of AI technology in pedagogic practices.

Methodological differences in data analysis are required to be considered when integrating both quantitative and qualitative study insights. When collecting the data, specifically during interview and survey studies, different types of challenges were faced relevant to technology usage. For example, participant experiences were impacted, and data collection might be interfered with when technical issues occurred with AI usage, including connectivity and incompatibility. Data biases might be introduced by these problems that influence the perceptions of participants regarding AI technologies.

It is essential to acknowledge the limitations, although this study provided valuable insights relevant to AI adoption in higher education. The study limitations included difficulties faced during the collection and analysis of data and challenges encountered when generalising data findings to other countries or contexts. In spite of the study limitations, this study provides in-depth insights into the role of AI technology in transforming educational institutions, particularly

in the UK, such as CU and UWTSD. The retrieved data findings have contributed to the literature studies regarding AI's impact on student learning outcomes and teaching strategies in higher educational institutions. Future research should focus on addressing the study limitations and research gaps to explore new avenues in the education field.

6.9. Future Research Recommendations

This research study discussed data insights into AI adoption in UK higher education, specifically in two universities, CU and UWTSD. As discussed above, this study has some research limitations that can be addressed in future research. According to the data findings from both questionnaire survey and interview's insights and discussions, several research recommendations need to be investigated. However, these points will be significant in understanding the role of AI in the education field, including the long-term effects and scalability of technology across institutions in the broader context.

6.9.1. Potential Areas for Further Study

This study was focused on providing insights into AI adoption across UK higher education institutions. However, the effectiveness and experiences of educators and students could differ when integrating AI technology in other countries or regions. Specifically, developing countries might get different experiences due to factors like educational policies, access to digital resources, and technological infrastructure. Thus, it would lead to the provision of global perspectives regarding AI adoption by facilitating comparative studies across different regions or countries. The specific challenges and opportunities in different educational and cultural contexts could be identified. As a result, it would offer valuable insights for educational institutions and policymakers to adopt AI technologies in alignment with their needs.

Future research should also consider exploring the influence of AI across different fields within the higher education context. Since this study focused only on the effectiveness of AI on student learning and teaching in UK higher education, future research should investigate how AI influences different disciplines like social sciences, business education, humanities, and STEM.

For example, AI tools like adaptive learning methods would be beneficial in STEM, in which content is structured and targeted. It might be less effective in student feedback and assessments that require different types of AI technologies. Future studies should explore how AI can provide tailoring methodologies to investigate both opportunities and challenges in diverse educational contexts to meet unique needs.

Another aspect is to explore how AI tools can support students with disabilities. AI-based systems like automated captioning systems, personalised learning assistants, and speech recognition can be used to facilitate customised support for students. The research study can examine the effectiveness and accessibility of AI tools to create an inclusive learning environment for students. Future research would contribute to the AI field in education by understanding better educational outcomes of AI among students with disabilities.

From the qualitative data findings, educators had different comfort levels and familiarity knowledge regarding AI technologies in the higher education context. Some educators opined that they should be more cautious or against AI tools owing to the ethical, trust, and reliability concerns. On the other hand, some others shared positive experiences with the AI tools. Future research should explore how training development programs can be supported by the effective integration of AI in enhancing teaching strategies. Based on longitudinal studies, future research can investigate the influence of AI training programs on the attitudes and skills of educators and how they improve teaching methods and student learning outcomes.

6.9.2. Exploration of AI's Long-Term Impact on Education

Effect on Student Outcomes

There is a requirement for longitudinal research that monitors student outcomes over a long time when this current research offered a concept of AI's effect on learning and teaching. The tools or equipment of AI possess the possibility to encourage academic performance, motivation, and involvement of students, but such impacts are not directly deceptive. Further investigation tends to evaluate how AI tools take part in career readiness, skill improvement, and academic success in

the long term. At the same time, exploring the long-term impacts on the collaborative skills, problem-solving competencies, and critical thinking of students as an outcome of AI-based education stands as an actionable participation to assess the complete ability of AI in converting the education system.

Exploring the Effect on Student Development

As AI seems more associated with higher education, the effect of AI on the well-being of students needs to be investigated. AI's application in education was integrated into both negative outcomes, including reliance on technology and enhanced stress, and positive outcomes, including tailored learning experiences. The study seeks to investigate how AI fosters the emotional and mental health well-being of students. As an illustration, does the continuous review from an AI-based process encourage students, or does it contribute to anxiety and stress? Therefore, an effective assessment of AI's effect on the psychological health of students leads to support institutions in conducting AI-assisted cultures that prioritise development.

Evaluating Privacy and Ethical Concerns

There is a requirement for a long-term study that concentrates on the changing characteristics of such concerns when ethical concerns about AI in education were demonstrated in this present research. As AI seems more associated with educational processes, concerns about responsibility, algorithmic biases, and data privacy are rising in significance. Therefore, further study needs to investigate how educational organisations cover such barriers over time and the robustness of diverse methods in preventing ethical risks. Exploring how the insights of moral concerns and privacy of students convert as they practice AI technologies over several years tends to inform policy establishment about AI application in the context of education.

6.9.3. Recommendations for Expanding Research Across More Institutions

Cross-Sector Collaboration Research

In the educational field, AI is intended for technology incorporation within the classroom and also contains wider institutional conversion. Further investigations can concentrate on cross-sector association between certain universities and stakeholders, such as private sector firms, technology organisations, and government agencies. Assessing how such collaborations provide or restrict AI incorporation can facilitate perspectives into the wider ecosystem required to leverage AI association in higher education. Therefore, the present study can investigate how collaboration with tech organisations contributes to AI technology improvement that addresses the exceptional requirements of educational organisations and how public policy assists AI adoption.

Multi-Institutional Research

Future study needs to acknowledge extending the opportunity of AI amalgamation research to contain several organisations, especially those in different institutional types and geographical locations. Researchers can acquire a more inclusive perspective of how AI can be incorporated into diverse types of educational cultures by employing a number of universities, such as large, medium, and small institutions, and also online education facilitators and community colleges. Therefore, multi-institutional research can also disclose institutional challenges to AI implementation, including technological obstacles, educator change, and resource limitations, helping in establishing appropriate practices that can be incorporated throughout the higher education industry.

Study on AI in Online and Hybrid Learning Cultures

The pandemic of Covid-19 enhanced the incorporation of online and hybrid learning frameworks, which introduced exceptional scopes for AI associations. Further research needs to investigate how AI can assist learning and teaching in such landscapes where in-person associations are restricted. The study can evaluate the AI's role in understanding learning

outcomes, enhancing collaboration, and increasing student involvement in hybrid or online environments. Furthermore, research can investigate how AI can be implemented to leverage distant educator improvement, assisting educators incorporate to implementing AI technologies and actively employing online teaching frameworks.

Investing the Role of AI in Lifelong Learning

The role of AI in lifelong learning needs to be investigated as it becomes more associated with education. However, the random step of technological developments and the requirement for consistent skill improvement indicate that AI is going to possess a highly substantial role in the professional establishment and adult education. Future studies can explore how AI can be implemented to leverage lifelong learners, particularly in sectors experiencing frequent conversion for AI technologies and automation. Moreover, further investigation needs to examine how AI can assist adult learners in monitoring their success, determining research gaps, and availing tailored learning scopes that integrate with their career ambitions.

The AI alignment in an educational context is in the prior stage, and the research outcome facilitates actionable perspectives on how AI can convert learning and teaching. Hence, there are more areas to investigate, as this current study has revealed. Future research can offer a more inclusive assessment of AI's competency by extending the study scope to contain diverse scholars' long-term impacts of AI, regions, and institutions. Additionally, investigating areas including the role of AI in cross-sector collaboration, educator improvement, student development, and lifelong learning is going to promote further the AI's effect in informing policy and higher education. Moreover, the researcher, through continuous investigation, can confirm that AI seems to be equipment for comprehensive, customised, and changing learning skills for students globally.

6.10: Reflection on the Study

The association of AI into the context of higher education seems an innovative idea and also a current certainty that is changing pedagogical practices, institutional procedures, and learning experiences. The research investigated multifaceted AI's effect in higher education,

concentrating on its wider applications, barriers, and possibilities for policymakers, students, and educators. The study provides an inclusive assessment of AI's contribution to higher education and its further path by associating both the questionnaire survey and interview data. Moreover, this final section imitates AI's role in higher education, facilitates closing notes on its imminent in academic practices, and accomplishes the importance of research outcomes.

6.10.1: Reflections on the AI's Role in Higher Education

In higher education, the role of AI seems highly essential, catering as a substance for changing traditional academic practices. However, the outcomes from UWTSD ("University of Wales Trinity St. David") and CU ("Coventry University") emphasise the competency of AI to promote teaching expertise, improve administrative practices, and customise learning. Furthermore, tools such as Moodle and Aula encourage collaborative learning cultures when platforms including Grammarly and Turnitin cover writing expertise and academic alignment.

On the contrary, AI incorporation remains with certain barriers. The study emphasises substantial differences in association levels, with CU illustrating a more organised method differentiated from UWTSD. Therefore, the technological restrictions in stimulating creativity and covering ethical issues ensure attention when students and educators consider AI's capacity to promote academic performance and digital literacy. Moreover, such reflections show that when AI seems not to be a solution, its practices as a driver of innovation in an educational context are incontestable while adopted considerately.

6.10.2: Closing Notes on AI's Future in Academic Practices

In the context of academic practices, AI's future seems competent and also critical. The competency of AI to incorporate different learned requirements, leverage data-driven decision-making, and facilitate real-time feedback is going to construct the academic environment. At the same time, institutions that spend on adaptive implementation processes, ethical protocols, and training are going to acquire the majority of advantages, as observed in UWTSD and CU.

Furthermore, the growth of AI is planning to need cautious control between human-based teaching methods and automation. However, further developments need to intend to counterpart, compared to substitute practice in education, stimulating emotional intelligence, critical thinking, and creativity among learners. Therefore, collaborative models that contain technologists, policymakers, and educators are going to seem essential in directing the barriers of AI when exploiting its competency to promote learning and teaching outcomes.

6.10.3: Concluding Remarks on the Significance of Research

The research facilitated actionable overviews into the extent and suitability of AI's association in higher education, applying UWTSD and CU as guides. This study participated in a comprehensive assessment of how technology is supported to address different educational objectives by analysing AI's effect on digital literacy, student involvement, and pedagogy. The research outcomes also emphasised the differentiations in implementation and robustness, facilitating valuable suggestions for institutions intending to promote their academic practices. Finally, the research underscored essential areas for development, including covering ethical issues, improving resource allocation, and encouraging creativity in AI-based learning landscapes.

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Appendix A: Students' Questionnaire

This is Link for accessing Student's Questionnaire on Google Form:

https://docs.google.com/forms/d/e/1FAIpQLSdzP1WaeUM04ZFzG45iR1fD8YhNg09SHO1EN6KT0zw1a-Zl6A/viewform?usp=header

Closed-Ended Questionnaire for Student Survey:

Questionnaire for Evaluating the Integration and Effectiveness of AI in Pedagogy in Higher Education

The survey is being conducted to assess your experience in evaluating the Integration and Effectiveness of AI in Pedagogy at your Higher Education Institution (HEI). So, the question is: what does mean of AI tools in HE. Artificial intelligence (AI) tools in higher education is revolutionary technology that improve learning, teaching, and administrative operations. The tools encompass intelligent tutoring systems, personalised learning platforms, automated grading software, and virtual assistants.

This survey is essential to my Doctorate of Business Administration (DBA) at the University of Wales Trinity Saint David (UWTSD). Therefore, you are cordially invited to be a part of this survey to spare some of your precious time.

The questionnaire will take approximately ten minutes to complete. It doesn't ask for any personal details such as name, address, or DOB. Your participation will be kept entirely confidential and anonymous. The data gathered shall be reserved per the GDPR and UWTSD protocols. Thank you for reading the survey introduction and for your valuable participation.

Statement	Strongly agree	Agree	Neither agree nor	Disagree	Strongly disagree

			disagree		
Theme 1: Integration of AI in Pedagogy:					
I have found that incorporating AI tools into my pedagogical processes has been a positive experience.	☐	☐	☐	☐	☐
I'm comfortable using AI tools in pedagogical practices.	☐	☐	☐	☐	☐
AI tools such as Turnint, Chat GPT, Quizlet helps you to provide personalised learning and assessing.	☐	☐	☐	☐	☐
I believe that AI can enhance the learning experience for students in higher education	☐	☐	☐	☐	☐
I'm very confident to integrate AI into your pedagogical practices	☐	☐	☐	☐	☐
Theme 2: Impact on Student Experience:					

the integration of AI in pedagogy of this university influenced the overall learning experience for students.	☐	☐	☐	☐	☐
Available AI tools helps me to identify the personalised learning of the learners.	☐	☐	☐	☐	☐
AI contributes to a more inclusive learning environment.	☐	☐	☐	☐	☐
AI-generated content in courses enhances the quality of learning materials.	☐	☐	☐	☐	☐
AI tools such as Turnitin helps to assess students accurately					
Theme 3: Challenges					
Integrating artificial intelligence tools in my teaching practices is challenging."	☐	☐	☐	☐	☐

I believe that the lack of access to AI-related resources and tools hinders my ability to incorporate AI into my teaching methods.	☐	☐	☐	☐	☐
I receive professional development most often and training in AI to enhance my pedagogical skills	☐	☐	☐	☐	☐
Over using AI tools gradually moving out from emotional/ human touch	☐	☐	☐	☐	☐
The limited adoption of AI tools poses a significant challenge when attempting to integrate them into pedagogical practices.	☐	☐	☐	☐	☐
Theme 4: Future AI tools Implementation in Pedagogic Purposes					
The future of AI tools integration in pedagogy at your	☐	☐	☐	☐	☐

university is bright.					
My university is enthusiastic about expanding the use of AI tools in the near future.	☐	☐	☐	☐	☐
AI tools could help to improve personalised study plans contribute to my academic success.	☐	☐	☐	☐	☐
University should have clear strategies to implement AI tools in pedagogy practice	☐	☐	☐	☐	☐
We should have regular training program to implement AI tools in pedagogy practice	☐	☐	☐	☐	☐

Appendix B: Interviews Questions:

Interview Questions for Educators

Q.1: Gender

Male

Female

Q.2: Employment Status

Lecturer

Module Leader

Academic Manager

IT staff

Theme 1: Integration of AI in Pedagogy:

Question 1: "Can you describe the specific ways in which your university has incorporated AI tool such as automating grading process, Moodle, black board, Turnitin, Aula personalised learning method, Virtual Reality (VR) and Augmented Reality (AR), Chatbot, DreamBox and Smart Sparrow into their teaching methods and curriculum?"

Question 2: How are these tools being utilised in the classroom?

Question 3: Are there specific AI-driven tools or technologies that have been particularly effective or ineffective in enhancing the educational experience at your university?

Theme 2: Impact on Student Experience:

Question 4: "From your perspective, how has the integration of AI in pedagogy at your university influenced the overall learning experience for students?

Question 5: What do you think are the main benefits of using AI in teaching and learning environments, and how do you think these advantages help improve educational results for both educators and students?

Theme 3: Challenges and Limitations:

Question 6: "What challenges or limitations have you encountered while integrating AI into pedagogic practices at your university? How have these challenges been addressed?"

Question 7: Can you provide examples of situations in which the implementation of AI in education failed to fulfil your expectations or posed unforeseen difficulties?

Theme 4: Future Prospects:

Question 8: "Looking ahead, how do you predict the future of AI integration in pedagogy at your university? Are there any upcoming initiatives or plans to further enhance the use of AI in teaching and learning?"

Question 10: Based on your expertise, how do you anticipate that AI technology will improve

instructors' capacity to cultivate digital literacy, creativity, and academic achievement in students? Could you perhaps cite concrete instances or situations where AI tools have previously demonstrated potential in attaining these desired results?

Stakeholder Engagement and Feedback:

Q.11: "Could you tell me more about how academic staffs, students, and other important people are involved in making decisions about integrating AI?"

Appendix C: Sample of Interview Transcript

Transcript

22 April 2024, 10:52am

MM **Mohammad Masud (2118438)** 0:03
Thank you. And that you agreed to participate.

Mohammad Masud (2118438) started transcription

MM **Mohammad Masud (2118438)** 0:08
In my project and my data collections. So thank you again and so I know that you're very busy and thank you for your time so.
I'll just ask you a few questions regarding the impact of artificial intelligent tools, how it helps educators.
To improve their our learning our practise so.

First question, so I'm going to ask you if you allow me that, would it be possible to give me some overview, current teaching and learning environment at your university, how it works? Are you using artificial intelligent tools?

Anupam Mazumdar 1.15

Thank you, momma. Thank you for asking these questions. Now regarding your question that the overview of AI and whether we are using it or not to be honest here at UWTS to London campus that we have got fairly limited scope of applying AI within the curriculum. But however the university has come up with some guidance, some outlines. So which is which is still like I can say at the at the very initial stage.
So going forward, probably that we would be applying those framework those guidelines onto the students assessments on assessment, generation creations and all those things, even in terms of in terms of module materials, generation schedule. So unfortunately at the moment.
That's not much usage of AI or any other AI tools at EWTS to London.

MM

Mohammad Masud (2118438) 2.15

But we're using like model and the the tools.

Anupam Mazumdar 3.10

Yeah, but Moodle.
Model we are using model we are using but however the model is not an AI tools model is a cloud is a cloud platform basically so.

MM

Mohammad Masud (2118438) 4.50

Hold.
Yeah.

Anupam Mazumdar 5.00

Is internally 2 different things, so and. That's why I do not want to say anything about model because it's not directly relevant to AI.

Mohammad Masud (2118438) 5.57

Yes.
Alright, thank you. Because you are the expert. You are the you have the IT. Yeah. Yeah, the expert. That is the reason that's very keen to ask you a few questions. That's the reason. And is there any tools at the moment you're using you're integrating?

Anupam Mazumdar 6.35

I'm not an expert.
Mm hmm.

Mohammad Masud (2118438) 7.21

AI tools in the curriculum or teaching methods at the moment?

Anupam Mazumdar 8.17

Not really. As I said that because university is not something that I can do personally. So

obviously that the university needs to come up with centrally in terms of implementing or adopting AI or any other modern technologies. So however, but if you as you ask me, so I can say personally what I have done even over the last term as well, I have taken some support from one of the tools at the platforms called chat zpt.

Mohammad Masud (2118438) 9.15

Alright.

Anupam Mazumdar 10.30

For example, to simply produce that assessment tasks basically OK at the same time the suggested answer, who is a head pound? OK, yes, it's really good. Really interesting to see that. OK, how how AI actually can help educators like us to very quickly develop some assessment briefs as well. And it's it's going to be nearly real time assessment scenario, OK.

Is providing me the answer as well. So yeah, that's what I have done. Other than that nothing else that that I have used here.

Mohammad Masud (2118438) 12.45

Alright.

Alright, thank you. Thank you. Thank you. And how are academic start trained to effectively to lies artificial intelligence? Is there any framework as you said they're coming with the framework but at the moment academic Staffs, they're getting any training to use artificial intelligent things.

Anupam Mazumdar 13.17

Oh, look, I I I I use like to say here that AI is a hot cake now, right? It is an hot cake and it has got lot of like let's say rumours here and there. So it's still that hard actually AI is moving and AI actually taking us to move with AI is not clear. It's not clear yet and therefore that in terms of training and development yes there is like so many things here and there they're talking about this turning that turning. But in terms of if I talked about machine learning deep learning as an example or even natural language processing.

Mohammad Masud (2118438) 14.56

Yeah.

Anupam Mazumdar 15.57

They all are coming apart of your AI, but the question is how much do we know? That's the biggest question. OK. Do we really know about algorithm? The machine learning algorithm or even deep learning algorithm? We we simply do not know right? But we are only talking about AI, AI, AI, AI and that is one of the one of the biggest biggest issues that to me that that's what I have seen. Now the second part of your question regarding regarding that stop training.

Mohammad Masud (2118438) 16.11

Alright.
Yeah.

Anupam Mazumdar 16.87

As I said that the university has recently introduced a a guidance. Basically OK guidance for this step, guidance for the professional staff guidance for the students as well. But

however the face to face training is not implemented yet. I think I think next week or like some point some point in May probably there is a there is a formal training for that for this step step members. So yeah that's what the current current scenario at the moment.

Mohammad Masud (2118438) 17.53

Alright.
All.
Alright. Thank you. Yeah, thank you. You know that I about to ask you a few questions more regarding concern already we answered it. So we can save our time. Thank you again. So when you're using personally like ChatGPT or any others or maybe any other tools in your classroom, is there any positive feedback from your learners?

Anupam Mazumdar 18.20

Well, in terms of positive feedbacks, as you know that though I have got the A competing background, but currently I am I am I'm I'm actually focusing on delivering lessons to the business students and and you know that business student there there anyway they do not have much idea like majority of them. I can say that they do not have any idea about technology, modern technology or even AI et cetera. So for instance that OK if I talked about I think it was not the February time but in October from last time that when I was showing to the students in that class that how they can even find the answer or even to just investigate or to explore things.

Mohammad Masud (2118438) 18.21

Yes.
Alright.
All right, all right.

Alright.

Anupam Mazumdar 19.23

With the support of AI, they are completely surprised that how is this possible, right? So yes, the positive is feedback, definitely positive is feedback that, oh, that means it's very easy to get all the answers. They said yes, it's easy to get answers, but you need to be very cautious that do not copy and paste. Then we can easily detect that. OK, this is your work or someone else work even the time 18 is also implementing that AI detector. So it's it's going to be another challenge. But yes even in February term I have spoken to a couple of groups as well about it and then.

Mohammad Masud (2118438) 19.33

Thank you.
Alright.
But yeah.
Yeah.

Anupam Mazumdar 19.55

Looks like OK that they found it very interesting.

Mohammad Masud (2118438) 20.12

Thank you, doctor from EU, just answer everything you know. I interviewed other 2-3 colleagues and I had to ask many questions, but you answered all of them in very compact to it and just last questions. I know that you're busy. You have a meeting at 12. That what do you believe are the future trends and development regarding the use of artificial

intelligence in higher education?

Anupam Mazumdar

Look, I would be, yeah, I would be a little bit optimistic here and I would like to give you an example. Let's at some point when like our our our father or even like the grandparents that they used to use pen and paper right for every single calculation. Then what happened? The calculator came up, right. Have we have we adopted them? The answer is yes. We have adopted calculator then scientific calculator then computer. Right.

Mohammad Masud (2118438) 20.45

Just a couple of sentence.
All right.
Yes, you're right.
Yeah.
Yes.

Anupam Mazumdar 21.12

It's keep coming basically. OK, so now what is the future trends? I can say that, OK, that doesn't matter whether this is that AI in education, higher education or business.

Mohammad Masud (2118438) 21.45

Yeah.

Anupam Mazumdar 22.10

This is the future, so whether you accept it today or not, but tomorrow you will have to accept it and adopt it. There is no shortcut. There is no like what is called that the exclusion or any other route that you can go ahead instead of adopting or accepting AI. That is my my thought.

Mohammad Masud (2118438) 22.45

All.

Alright.

Alright.

Alright, thank you. Thank you, Doctor from that's all. Thank you. Thank you for your valuable time. Thank you. OK, hope to see you soon.

Anupam Mazumdar 22.55

OK.

No problem at all. If you need any. If you need any further information please do let me know. We can even have another meeting. That's fine as well. OK. OK. Thank you. I wish you good luck. Thanks. Bye. Bye.

Mohammad Masud (2118438) 23.15

No problem. Thank you. Thank you again. Thank you for your time. Thank you. Bye. Bye. Bye bye bye.

Mohammad Masud (2118438) stopped transcription

Appendix D: Sample of Interview transcript of IT staff

Semi Structured Interview

The semi-structured interview is being conducted to assess your experience in evaluating the Integration and Effectiveness of AI in Pedagogy at your Higher Education Institution (HEI). So, the question is: what does mean of AI tools in HE. Artificial intelligence (AI) tools in higher education are revolutionary technology that improve learning, teaching, and administrative operations. The tools encompass intelligent tutoring systems, personalised learning platforms, automated grading software, and virtual assistants.

This survey is essential to my Doctor of Business Administration (DBA) at the University of Wales Trinity Saint David (UWTSD). Therefore, you are cordially invited to be a part of this interview to spare some of your precious time.

The interview will take approximately 15 minutes to complete. It doesn't ask for any personal details such as name, address, or DOB. Your participation will be kept entirely confidential and anonymous. The data gathered shall be reserved per the GDPR and UWTSD protocols. Thank you for reading the interview introduction and for your valuable participation.

I want to thank you is taking part in this journey of research and discovery for your invaluable contributions to the advancement of knowledge and new ideas in the field of education. Let's keep going with excitement and interest, hoping to find ideas that could lead to huge improvements in the way we teach.

Without further ado, let the conversation begin.

The following are the semi-structured interview questions for IT staff to assess their experience in evaluating the integration and effectiveness of AI in pedagogy at their Higher Education Institution (HEI):

Q.1: Can you explain your role in your University?

Answer: Currently, I work for one of the UK universities as a IT manager. I have been overseeing IT (technical team) team who is responsible to provide IT support to academic team and admin team.

Q.2: please explain, what types of AI tools or technologies uses at your university to improve the learning and teaching experience (e.g., automated grading system, virtual tutors, personalised learning platforms)

Answer: Our university has not been using very specific software which only based on AI but some of the platforms (e.g. Turnitin, Aula, Chatbot,) are integrated with AI features.

Q.3: Have you been involved in selecting, managing, creating and deploying AI tools uses for teaching and learning purposes?

Answer: we are not involving selecting, create and deploying AI tools which useful for the teaching and learning purposes. However, we recommended time to time accordingly.

Q.4: Please explain your role in supporting AI tools used for teaching and learning purpose at your university

Answer: As an IT manager, I ensure to support deploying and integrating software, and involve in establishing technical infrastructure and providing ongoing technical support. I provide time to time training whenever necessary to facilitate effective use of AI tools. I ensure there is a collaboration between the academic staffs and understand their needs. Overall, I ensure that there is a seamless adoption and operation of AI tools in order to support academic team in their teaching and learning process.

Q.5: can you describe, what types of Artificial intelligence tools used or adopted for pedagogy purpose? Please evaluate their effectiveness.

Answer: we use various types of AI tools for teaching and learning. The IT tools are Chatbots, personalised learning experience, receive customised feedback. These tools help significantly improve learning and teaching experience.

Q.6: How do you ensure successful collaboration with academic staffs to implement AI tool to meet learning and teaching needs?

Answer: As an IT manager, I ensure my team effectively collaborate with the academic staffs to use AI tools and support students accordingly. Communication is the key for me and my team to ensure facilitate all available tools. I and my team arrange training, workshops, user guides and offering continuous technical support to help staff into their teaching practices.

Q.7: Please describe the challenges you face to integrate and implement AI tools in pedagogy purpose?

Answer: As an IT Manager, Pedagogical purposes poses various challenges such as compatible issues, and regular training programs for academic and IT staffs. Most important challenge is fundings which really creates ultimate thereat to implement AI tools as many current systems needs replacement with up to date system. Currently, higher education has been passing very difficult time due to financial issues. Data Privacy and Security is another significant concern as AI tools needs to comply with GDPR. University needs to protect everyone's data. Sometimes, there is a resistance from the academic staffs to make coordination to implement AI tools in teaching and learning.

Q.8: How do you address them/challenges?

Answer: I and my team has been taken some initiatives to overcome the challenges to implement some of the strategies:

I and my team worked closely with the suppliers and relevant department to ensure that AI tools are working/compatible with the existing system. In order to that massive team work needed for testing to ensure seamless functionality. I priories compliance of the data privacy and conducting regular audit and ensuring all the software including AI tools meet all the regulations including GDPR. We implement robust security measures to access and control to protect sensitive data of the stakeholders.

I also ensure that everyone gets training and coaching if any new software including AI technology implement in University IT systems. However, academic team is the first team to provide support, so effective teaching and learning take place smoothly.

Q.9: So far, how have AI tools impacted the teaching and learning process?

Answer:

I strongly believed that the support we are giving to academic staffs has been very effective and helps to improve teaching and learning process. I can say that, available AI tools and other IT tools help to enhance academic teams and student experience. For example, tailor contents helps to meet individual student's needs and allowing them to learn their own way and gets feedback based on their needs. The Chatbots which associated with the AI-powered offering 24/7 support for student queried and it also reducing administrative work on academic staffs including lecturers. Automative grading tools helps to have effective assessment processes and providing quick feedback. This tools helps the academic staffs to identify the students' progression and support them accordingly.

Q.10: Do you feel that the current AI tools are sufficient to adapt/implement to future learning and teaching process?

Answer: they may not be completely sufficient to fulfil future learning and teaching process. Day by day the demand of implementation of AI tools have been increasing and

university needs invest more to fulfil the demand. Future tools need more personalisation and need better integration with emerging technologies such as VR/AR. In addition, the data privacy and ethical issues must be addressed.

Q.11: Do you receive training program to enhance` your knowledge and skills to integrate AI system in your university?

Answer: I have been providing information in this interview that we have been receiving training and also I and my team provide training to improve skills and knowledge.

Q.12: How does your university ensure data privacy and security when using AI in pedagogy? Have there been any challenges in this area?

Answer: Our university ensure IT security and privacy by adhering regulations and policies such as GDPR. Our regular inspections and compliance check helps to ensure data privacy and security. We also ensuring third party tools to meet our privacy and security requirements.

Q.13: Are there any recommendations to enhance the effectiveness of AI tool to improve teaching and learning process?

Answer: in order to improve the effectiveness of AI tools, our university needs more up-to-date AI tools and needs more investment. Needs to arrange training more often than now which will improve tool adoption and utilisation.

Appendix E: Sample of Participant information sheet

University of Wales
Trinity Saint David
LONDON

SAMPLE PARTICIPANT CONSENT FORM

TITLE OF RESEARCH STUDY:

Investigating the appropriateness and extent of artificial intelligence (AI) for pedagogic purposes: a case study of Coventry University (CU) and the University of Wales Trinity St David (UWTSD) in higher education, UK

Please answer the following questions by ticking the response that applies

	YES	NO
1. I have read the Information Sheet for this study and have had details of the study explained to me.	☐	☐
2. My questions about the study have been answered to my satisfaction and I understand that I may ask further questions at any point.	☐	☐
3. I understand that I am free to withdraw from the study within the time limits outlined in the Information Sheet, without giving a reason for my withdrawal or to decline to answer any particular questions in the study without any consequences to my future treatment by the researcher.	☐	☐
4. I agree to provide information to the researchers under the conditions of confidentiality set out in the Information Sheet.	☐	☐
5. I wish to participate in the study under the conditions set out in the Information Sheet.	☐	☐
6. I consent to the information collected for the purposes of this research study, once anonymised (so that I cannot be identified), to be used for any other research purposes.	☐	☐

Participant's Signature: _____ _____ Date:

Participant's Name (Printed):
Contact details:

_____

Researcher's Name (Printed): Mohammad Masud

Researcher's Signature: _____M Masud _____

Researcher's contact details: Mohammad Masud
2118438@uwtsd.ac.uk
Please keep your copy of the consent form and the information sheet together.