

Software application assignment

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Students' Feedback in Laboratory's Learning Experience

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Abstract

Laboratories have been given important role in education discipline and learning science, engineering and laboratory activities. Nevertheless, this teaching approach makes valuable contributions to students' learning. Meanwhile, this traditional teaching approach faces many challenges, and changes. Therefore, a suitable approach of adapting changes has to be implemented to reach efficient method of learning in laboratories. Hence, a survey has been done among engineering students to allow researchers and teachers specify the engineering students' opinion regarding laboratory experience. The idea of the survey is to collect and analyse data from first year (level 4) Digital Skills Engineering students, male and female (60 students), especially in terms of understanding the course and confidence level for both male and female students. The results of a comparison between male and female learning's experience in laboratory indicate that male students are more comfortable and confident than female students in laboratories' practices and activities. However, the survey also shows that there are many issues in relation to students' demands have to be addressed, especially that related to staff numbers, equipment's, availability of laboratories' rooms in weekend and evening time and the catch up sessions. The general picture reflects that this study helps to identify the advantages of students' learning in laboratories and the other relevant approaches and ideas which might be used as future guidelines for Digital Skills Engineering laboratories teaching and learning new approaches and adaptations.

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1. Introduction

Through over the years there were many examples of laboratory's experience based teaching methods, where the Greek philosopher and scientist- Pythagoras built the first laboratory in the history of mankind to conduct experimental work in the field of strings' vibration and sounds. Later the German scientist Justus Freiherr von Liebig developed the first method of teaching in laboratory which depends on prior theoretical knowledge integrated with the practical concepts. He claimed that his method allowed students to learn from observation and analysis. All these examples of laboratories instruction which have been used as teaching and learning tool, paved the way for broad integral part consists of theoretical knowledge and practical demonstrations to be implemented in science and education. Up to date, there are four types of laboratory instructions have been implemented in teaching so far: Discovery instruction, inquiry instruction, problem based instruction for laboratory classes only and expository instruction. This last method is the most popular method of all method because of its low costs and it requires minimum staff and large number of students. Whilst Inquiry instructions used widely in laboratory as alternative method for the traditional existing expository method to train students for the sake of being able to engage in investigation of specific problem. The best way to find out good results from experiments is through critical thinking and deep analysis where the students will be able to figure out empirically the best procedure of conducting experiments and the expected results of the investigation.

2. Overview

In the 18th century laboratory was introduced for the first time in education mainly at Universities, high schools and colleges to post the teaching and learning in the engineering discipline and practices where experiments were often be conducted and discussed dependently on laboratory work results, especially in the field of engineering and science [1] Hofstein and Lunetta(2004).

In the 19th century specifically during the first and second world wars laboratories-based teaching and learning method faced huge demand from the industry to obey the advances in manufacturing and technology, where skills people with practical experience were highly requested. However, the essential role of laboratories until the middle of the 19th century, was to produce results for experimental work carried out by scientists and to promote the idea of laboratories are the only proper method for teaching and learning [2].

In the 20th century laboratories became the pack bond of applied science and engineering education curriculum and also became the horse power of the industry to meet the rapidly growing advance in the technology [3].

In the UK the quality assurance agency (QAA) and UK Standard for professional engineering competence (UK-SPEC) require specific desire and skills level from students who are preparing to join any engineering discipline, these requirements have to be achievable within the following fields: Personal skills, knowledge and the ability to learn, commitment & motivation, management skills and leadership, creativity and design capabilities in products and other relevant services and practical skills and problem solving abilities [4,5]. However, it is easy to learn and to master these skills via laboratory learning approach than lecture- based teaching approach, whilst many researchers believe that laboratory based teaching approach allows students to learn and achieve easily the above mentioned skills with high efficiency [6].

3. Methodology

In this study, first year mechanical engineering students (level 4, and foundation) have been scheduled to undertake the module (ACMA4014) technical skills development, within the department of engineering where 60 students age between 18- 23 years were invited to attend the compulsory laboratory classes of three hours. They were requested to prepare for the laboratory sessions by studying their pre lab- lectures notes and the enclosed materials. After experimental work was carried out and at the end of the session the students have been provided with questionnaires to participate in a survey, their Feedback to the questionnaires are the prime source of this study. However, all the 60 students were able to deliver the questionnaire successfully with the required specification. The collected feedback from the questionnaire has been recorded in excel software to be used for analysis.

The questionnaire was constructed of five sections with a mixture of tick box and free-text questions, where all questions are designed according to the following aspects:

- 1- What are your opinions about the laboratory experiences in Digital Skills Engineering practical 1 (ACMA4014)
- 2- Have you got any previous laboratory experience prior to this practical
- 3- What is your experience in experimental work related to mechanical engineering practice1
- 4- What are your opinions about learning experience
- 5- What are your suggestions that could improve the lab sessions

The answer to these five questions are in the form of Likert scale from zero to five, from strongly agree (5) to strongly disagree (1) as follows;

Strongly agree-5

Agree- 4

No answer- 3

Disagree- 2

Strongly disagree-1

The data have been selected carefully and analysed in- group in respect to specific key issues towards labs learning's approach improvement and students' opinions relevant to that.

However, the questionnaires explain clearly at the end of each one of them the purpose of the survey and whether the students have the right to be involved or not. Whilst, students' data regarding this survey are kept confidential with anonymity assured, as all the data and information were presented in a form of a graph or table to protect anonymity (see table 1 and graphs 1, 2,). Table 1, in the Appendices.

5 = strongly agree, 4 = agree, 3 = No answer, 2 = disagree, 1 = strongly disagree

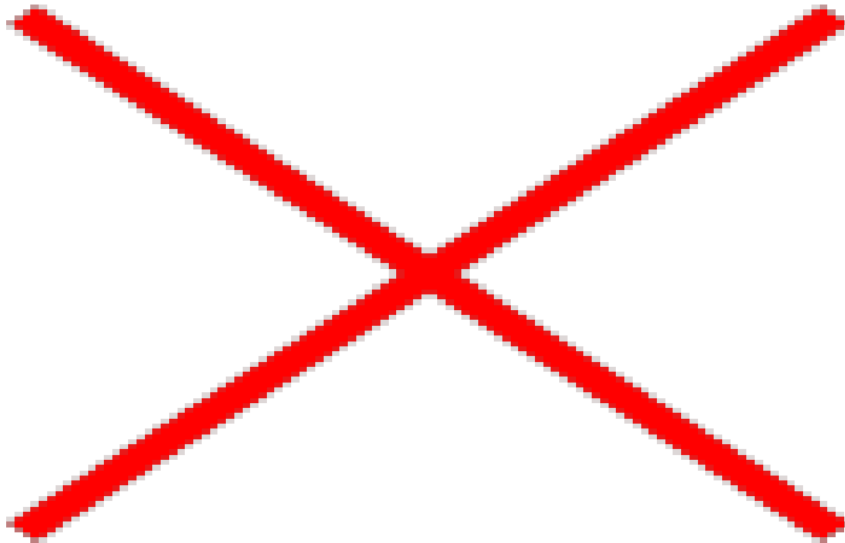


Figure1. Students' Opinion about carrying out laboratory's experiment

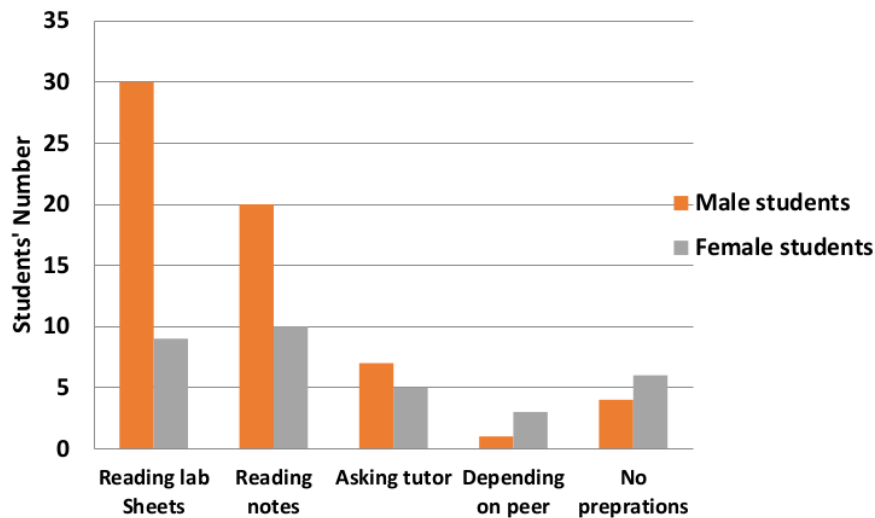


Figure2. Students' Opinion about laboratory's experiment pre-preparations

4. Discussion

Feedback from male and female students in regard to their opinion in laboratory's experience in Digital Skills Engineering Laboratory (ACMA4014) practice1, are shown in table 1 and figure1 where 83% of the students gave positive feedback in respect to their joy of the experiment, meanwhile their score was also high in the other aspects such as well organised and satisfying for both type of gender female and male. At the same time small percentage (2.9%) of the students gave negative feedback especially in regards to the satisfaction and the interest level. In addition to that and in this study preliminary survey among first year students and foundation in terms of age group reflects that younger students (18-21) haven't got the potential to score high marks in laboratories subjects than those students whose age are greater than 23 years. The reason why older students always achieve good results because they found laboratories tasks more interesting valuable and enjoyable. Hanif et al, investigated the perceptions and opinions of first and third year university students in the field of physics. The variation between younger and older students occurred as a results of several teaching approaches have been used in laboratories. However, in this respect teacher in the laboratories usually they pay more attention to younger students in terms of training abilities due to less relevant knowledge and skills.

Figure 2 is in accordance with the scenario, where student were requested to be fully prepare for the experimental work by anyway, whether by reading pre-lab lecture notes

or asking tutors or engage in teamwork's questions and answers revision prior to laboratory session. The figure also shows that few percentage of students rely on asking their peer group for laboratory session pre-preparations and yet again small percentage of female students go to the lab session without any prior preparations and that is due to the fact that female students are less interested in hands skills work. Meanwhile, figure 2 also shows that the majority of students prepare themselves for lab session by depending completely on reading labs sheets, pre-lecture notes and asking tutors prior to the labs session.

Furthermore, the students' feedback reflects that there are some students who had previous practical work experience prior to their enrolment in the university. Those students their performance was excellent due to their previous experience; this especial status encourages other student to be interested in laboratory's experiments and to be competitive in group work. However, their feedback's, also shows that they enjoy learning in laboratory and they are very happy to be involved in a team work. Meanwhile students addressed few issues such as more equipment's are needed, more staff for help are also needed and more time for catch up sessions is also needed.

5. Conclusion

In this study first year Digital skills Engineering students at the University of Wales Trinity Sent David (UWTSD) feedback about their laboratory learning has been investigated in depth to identify several outcomes. The study shows that the majority of the students are satisfied with the existing procedure via which the experiments have been conducted in the laboratory. Their feedback reflects that they are completely convinced that laboratories learning are useful to improve students understanding of a particular subject, improves hands skills and other capabilities. The students also show their preferences to study via practical sessions in fever of theoretical lectures, where 50 students of the 60 students that form the total class capacity reported to choose for practical session in fever of theoretical lecture. However, there are some opposite opinions from some researchers in respect to this statement, but it has been neglected. This study also proved that male students are positive and interested in laboratories sessions than female students. Whilst, female students show less interest and low confident in practical sessions in comparison to male student. At the same time there still a positive feedback in this respect from female students, as their progress is not negatively impacted by the surrounding effects, yet few of them in their feedback gave strong commitment and enthusiast to accomplish their labs session on the given time frame.

6. References

[1] Hofstein, A. & Lunetta, V. (2004) The laboratory in science education: foundations for the twenty-first century, science Education, 88, 28-54

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7. Appendices

<i>Students' Gender</i>	Satisfaction level					Total
	Strongly agree	Agree	No answer	Disagree	Strongly disagree	
Male (40)	30	6	1	2	1	40
Female (20)	4	10	0	3	3	20
Male Comments	Enjoyable	Organised	Interesting	Satisfied	Not-satisfied	Excellent
Female Comments	Enjoyable	Organised	Not –Interesting	Satisfied	Not-satisfied	Good

Table1. Students' Opinion about laboratory experience for ACMA Practice1

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GRADEMARK REPORT

FINAL GRADE

/100

GENERAL COMMENTS

Instructor

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