

Critique qualitative research methods and quantitative research methods and justify your future choice by referring to your own research interest.

Research methods is an interdisciplinary discipline that encompasses a wide range of academic material of a very different nature. Quantitative data, qualitative data and theory. The first type of data has a scientific character and can be used for statistical tests, such as experimental results and word frequencies. The second and third types of data are linked to the discursive, introspective character of the arts. For example, qualitative data can be used for studies of judgement, feelings, insights, etc. Data-based research is relative to theoretical research, while data includes both quantitative and qualitative types(Wray & Bloomer, 2011, p.28).

The research methods commonly used in educational research and foreign language teaching and research include three main categories, quantitative research, qualitative research and mixed research. Scientific research methods are not simply about the methods, but the scientific ideas and logic hidden behind the methods. It is not an exaggeration to say that how one views scientific research involves how one views the world, and how one views the world largely determines how the researcher will conduct scientific research, as it directly determines what and how the researcher will conduct research. It is therefore particularly important that different research methods are required depending on the purpose of the research.

In the following we will discuss the content and characteristics of each of these three research methods.

Part 01

✧ **Quantitative research**

Quantitative research is a research strategy that focuses on quantifying the collection and analysis of data (Bryman, 2012, p. 160). It is formed from a deductive approach where emphasis is placed on the testing of theory, shaped by empiricist and positivist philosophies (Bryman, 2012, p. 161), approaching social phenomena through quantifiable evidence of relay on statistical analysis of many cases to create valid and reliable general claims. Often asks “why” question. It typically includes the generation of models, theories and hypotheses, the development of measurement instruments and methods, the experimental control and manipulation of variables, the collection of empirical data, the Modelling and analysis of data.

A quantitative research process usually includes the following steps: identifying the research question, literature review, formulating a hypothesis, designing the research methodology, sampling and collecting data, data processing and data analysis, drawing conclusions, and writing the research report

Quantitative research has the following general characteristics(Bryman, 2012, p. 178):

1. quantitative methods usually start from a hypothesis and the researcher will have a prior view.
2. The quantitative method is often about controlling and manipulating variables.
3. The quantitative method emphasises the objectivity of the research, away from the data, away from the person concerned, and the researcher is an outsider's perspective.

4. The data obtained are highly reliable and reproducible.
5. The conclusions obtained are generalisable.
6. In a truly experimental process, there are factors that are difficult to control, especially human behaviour, and sometimes ethical issues involved.

✧ **Qualitative research**

Qualitative research relies on data obtained by the researcher from first-hand observation, interviews, questionnaires (on which participants write descriptively), focus groups, participant-observation, recordings made in natural settings, documents, and artifacts. The data are generally nonnumerical (Creswell & Guetterman, 2021, p. 12). In short, qualitative is a process of describing and interpreting "in context" data in order to tell a story about a person, group of people, events, or concept, normally asks "what" and "how" questions. Qualitative methods include observation, interviews, introspection, diaries and journals, questionnaires, action research, ethnography, designed experimental methods, etc.

Qualitative research has the following general characteristics (Creswell & Guetterman, 2021, p. 16):

1. the researcher carries no rules and regulations prior to the investigation.
2. the researcher can observe the phenomenon to be studied as an outsider, allowing all events to occur and develop as they should, without the controlling or interfering.
3. the researcher can also participate in the activities under investigation, which has the advantage of being able to gain first-hand experience as a participant, but participation can also affect the course of events to be observed.
4. The general survey can be followed by an in-depth case study, which allows the researcher to get close to his or her subject, to the data, and to "understand human behaviour from the perspective of the subject".
5. The methods adopted are integrative and inductive, and the final results are mostly descriptive or reveal certain patterns in the process of description, i.e. hypotheses or theories are formulated.
6. The advantage is the high validity of the data. The disadvantage is that it tends to bring in the subjectivity of the researcher and it is difficult to make generalisations about the results.

✧ **Mixed research**

A mixed method is a combination of qualitative and quantitative approaches that allows for both depth and breadth of research on an issue. It provides a multidimensional and more accurate view, which is what is known as 'triangulation'. One major difficulty, however, is that it is difficult to use (Creswell & Cui, 2007, p. 164)

In theory, the qualitative and quantitative methods are clearly separated, representing the two extremes of research methodology. In practice, however, the two methods are often used in a mixed way, due to the constraints of various conditions. In fact, they are more often used in a variety of ways in between, so it is difficult to separate them absolutely. In reality, the two methods are more like a continuum with an infinite number of invisible scales that indicate whether a study prefers qualitative or quantitative analysis (Liu, 2015, p. 97). This means that there can be a basic methodological preference when conducting a study, but in no way does it preclude the use of other methods. This is because more and more researchers are realising that the results of a study based on one method alone are not as reliable or valid as those obtained using multiple methods.

The theoretical basis of quantitative research is objectivism, which is primarily a factual judgement. Qualitative research has a non-objectivist theoretical basis and is primarily a value judgement. However, this does not mean that quantitative and qualitative research are opposed to each other, but in fact they form a continuum, and there are many research methods in between, only some tend to be qualitative and others quantitative.

The concepts of qualitative and quantitative research are both very broad and the boundaries between them are not so clear-cut, and they are not incompatible. It can be argued that they represent two major research paradigms, each encompassing a number of specific methods, and that they can be used simultaneously. However, the distinction between the two is obvious and it is useful to distinguish between them.

✧ **Quantitative research vs. qualitative research**

In terms of value orientation, quantitative research seeks a depiction of the composition or performance of things that can be prescribed for study in terms of numbers, such as whether it is normally distributed and whether it reaches a significant level. There are precise measurements of its rank, degree, scale, range, etc. The aim is to capture the quantitative characteristics and quantitative changes of the object of study through mathematical statistics, arithmetic, analysis and analysis. Qualitative research, on the other hand, focuses on the profundity of interpretation. It pursues those specific characteristics that can reveal the inherent characteristics of things for detailed and deep excavation. It seeks to understand the object of study in depth. The aim is to further depict the problem from the perspective of the researched.

Procedurally, quantitative research focuses on finality and qualitative research on process. Quantitative research usually investigates based on indicators (e.g. the development of teaching objectives, classroom design, handling of teaching materials, selection of teaching methods, use of teaching aids, etc.) and it will make objective measurements, interpretations and judgements. It is a one-off process, concerned with static results and is summative in nature. Qualitative research, on the other hand, is more concerned with process and considers results without process to be water without a source. It focuses on the dynamic portrayal of the development process of the research object. The researcher depicts the dynamic process of the developmental, variable and educational nature of the research object through observation, recording, video, metaphor, analogy and analogy. The result is no longer simply a distinction between the strengths and weaknesses of the research subject, but rather a process building block for understanding and promoting the development of the research subject.

In terms of data collection, quantitative research focuses on rigour and structure, while qualitative research focuses on flexibility and openness. Quantitative research collects data with certain quantitative relationships, which are obtained by measurement through observation, experiments, questionnaires, scales, structured interviews and other methods, which are then analysed quantitatively through clear mathematical language and rigorous logical reasoning. The data is presented in the form of data and graphs. Quantitative research is strictly structured in terms of data collection, i.e. the items covered by the material collected, the variables observed and the inherent logical structure and risk framework between the variables are designed and determined in advance and cannot be changed. In contrast, the data collected in qualitative research is often descriptive, such as through extensive data collection through 'behavioural records', 'growth records', 'scenario-based tests', 'diaries' and other methods. This is presented in the form of detailed written text, vivid pictures or clear audio recordings. In qualitative research, data collection and analysis are often carried out simultaneously. Therefore, data collection is highly flexible, open-ended

and uncertain. The data collection plan may need to be adjusted at any time.

In terms of the role of the researcher, quantitative research focuses on neutrality, while qualitative research focuses on involvement. Quantitative research follows the idea of positivism, believing that "facts" exist objectively and that they are not subject to human intervention. It emphasises that the researcher is a subject independent of the research process and the researcher is independent of the research process and is able to remain neutral and to collect real information about the subject without any personal feelings. Qualitative research, on the other hand, follows the humanist ideology that the study of human behaviour is based on values. The researcher's life background, ideology, values and methodology inevitably influence the process and results of the research. Therefore, qualitative research acknowledges the existence of value-involvement and considers that 'facts' are constantly interpreted and developed in the interaction between the researcher and the researched.

On the issue of perception versus rationality, quantitative research focuses on scientific facts and favours rationality. Qualitative research focuses on humanistic concerns and leans towards the emotional. In quantitative research, from the determination of measurement tools, the control of irrelevant variables, the implementation of the measurement process, the testing of validity, the calculation and analysis of data to all aspects, links and procedures, quantitative research always emphasises scientific rigour, structure, logic and precision, fully demonstrating the persistent pursuit of "scientific facts". Qualitative research, on the flip side, places greater emphasis on a good relationship between the researcher and the researched, highlighting the researcher's personal experience of the inner life and capriciousness of the researched, and demonstrating full respect for the human being. In qualitative research methods, the researcher can see the traces of the participants, listen to their hearts, capture their thoughts, experience their feelings, and even touch their souls. Therefore, qualitative research may even trigger human beings to explore the meaning of life and the search for humanistic care.

✧ **Strengths and weaknesses**

As shown above, each research method has its own strengths and weaknesses.

In terms of **qualitative research** methods, their strengths are:

Firstly, it has advantages in the micro area of social research and human perceptions. It mainly uses participant observation and in-depth interviews to obtain first-hand information. Participant observation has the advantage of being able to capture not only the reasons, attitudes, procedures and basis for action decisions of the people being observed, but also the feelings of the people being examined in a given social situation, thus providing a more comprehensive understanding of their inner world and actions. Qualitative research focuses more on the perspectives of the participants and on how different people make sense of their respective lives, thereby revealing the internal dynamics of various social situations and of those characteristic dimensions of human experience. Secondly, the qualitative approach also has the advantage of being flexible and open to research. It does not limit and restrict the freedom of research as quantitative methods do, but only increases the opportunities and possibilities for discovery and creativity. Qualitative research methods are therefore important in breaking down traditional dogmatic models, eliminating the conservatism of social science research, freeing it from the confines of narrow convention frameworks and expanding the scope and horizons of inquiry.

However, the qualitative research method also has its own shortcomings and deficiencies that are difficult to overcome. Firstly, the objects selected are often not representative of the whole. Due to practical constraints, the

qualitative researcher can only use a small number of objects as the object of study, which inevitably leads to questions about the representativeness of the research. Secondly, it is more concerned with unquantifiable information about the characteristics and nature of the object of research, and is unlikely to provide strong evidence of causal relationships between things, i.e. inferred relationships between phenomena and essences. Thirdly, qualitative research relies more on the subjective experience and feelings of the researcher and lacks objectivity and reliability.

As far as the **quantitative research** is concerned, its advantages are:

firstly, it is capable of large-scale surveys and projections at the macro level, allowing measurement of thousands or tens of thousands of people in a short period of time. secondly, it is more standardised and precise with more rigorous logical reasoning thus making it more objective and realistic. Thirdly, quantitative research has a strong normative and intuitive character. It uses unified, rigorous and explicit research techniques to represent many complex things clearly and unambiguously with a symbol or a numerical model, defining things in a way that people can easily understand, giving a more rigorous, intuitive and reliable understanding.

Its limitation, however, is that it appears to be incapable of providing detailed, in-depth, dynamic descriptions and analyses of micro-levels in natural contexts, and It is often easy to leave out issues that cannot be quantified. The emotional communication between researcher and researched can be overlooked when the researcher starts with pre-set hypotheses and has difficulty understanding and investigating the mental states of the researched and phenomena that are unfamiliar to him or her.

Despite the fundamental differences between qualitative and quantitative research, there is both a need and a possibility to **integrate** the two in the practical research process. Paradigm differences do not require paradigm conflict" (Gage, 1989) They are opposing but complementary research methods, and they have complementary strengths. For example, the integration of the two can help to overcome the neglect of the researched in quantitative research and the over-reliance on the researcher in qualitative research. In quantitative research, the researcher is in a dominant and authoritative position. The researcher is in charge of what theoretical framework to use as a guide, what measurement tools to use, how to measure in time, how to test the reliability, validity, difficulty and discrimination, and how to transform the measurement results, etc. The researched person is in a passive position. The researcher is often blinded, consciously or unconsciously, under the guise of 'value neutrality' and lacks the self-criticism and self-reflection to make the research highly subjective and one-sided. In qualitative research, the researcher is constantly reflecting on his or her role in the research, challenging his or her own stereotypes and deeper perceptions at all times, and emphasising the reflection and understanding of the researched themselves. The reflection of the researched is not only an intrinsic motivating force but also fosters ownership of the researched, however, qualitative research can lead to an over-reliance on the personal qualities of the researcher.

Therefore, if the two methods can be integrated, there are at least the following benefits:

Firstly, the integrated approach overcomes both the neglect of the researched and the dependence on the researcher by facilitating the autonomy of the research subject, making both the researcher and the researched the owner of the research that allows both to have the opportunity and the right to participate in making choices and decisions. Secondly, integration is also conducive to compensate for the mechanical and encouraging nature of "pure numbers" in quantitative research, making the results more profound, detailed and flesh and blood, as well as bridging the logic gap in qualitative research and improving the objectivity and logic of its research content. Thirdly,

quantitative research relies on statistical methods to sample, measure, calculate and verify, with numbers being its indispensable symbols, risking the tendency to falsify research results for their own sake. Qualitative research is conducted in natural contexts where it is less controllable and more subjective. By integrating the two together neither of these tendencies can be largely avoided.

Part 03

The **research direction** I am interested in is the integration of educational technology and English teaching dedicated to the study of enhancing the English learning ability of first-year university students majoring in practical English in an information technology environment and the innovation of teaching models. In the field of educational technology research, it includes research on instructional design, research on learning resource development, research on the use of educational technology, research on the management of educational technology and research on the evaluation of educational technology, so the common research methods are experimental research, evaluation research, action research, design-based research and quality research (Xie & Li, 2017, p. 9). Combining the above descriptions, I would choose a combination of quantitative and qualitative research methods to conduct research in order to ensure the reliability of the findings. More specifically I would choose a mixed research approach with action research as the main focus, supplemented by experimental research.

Action research is not only one of the most widely used research methods in English language teaching research, but also a promising research method in the field of educational technology. In the sense of the action research method, it is a research method in which practitioners and experts work together in practical situations to come up with improvement plans for real problems which are implemented, verified and revised in practice to obtain research results. It is research in which practitioners are involved in action to solve their own problems (Burns, 2010, p. 5). A combination of the general and the particular, professional researchers and practitioners, theory and practice, and continuous and timely evaluation characterise it. In other words, the action research method is the analysis and decision making of a specific problem in the usual context and both the researcher and the practitioner are involved in the whole process from the development of the plan to the evaluation of the results with an ongoing and timely evaluation of each modification of the action in the process.

Secondly, it **differs** from other research methods in that (Burns, 2010, p. 11):

1. in terms of research objectives, it is "research for action".
2. in terms of the research object, it is "research in action".
3. in terms of the research environment, it is "research in action".
4. in terms of researchers, it is "research by actors".
5. in terms of the research process, it is "action and adaptation".
6. in terms of results, it is "improvement and development of action".

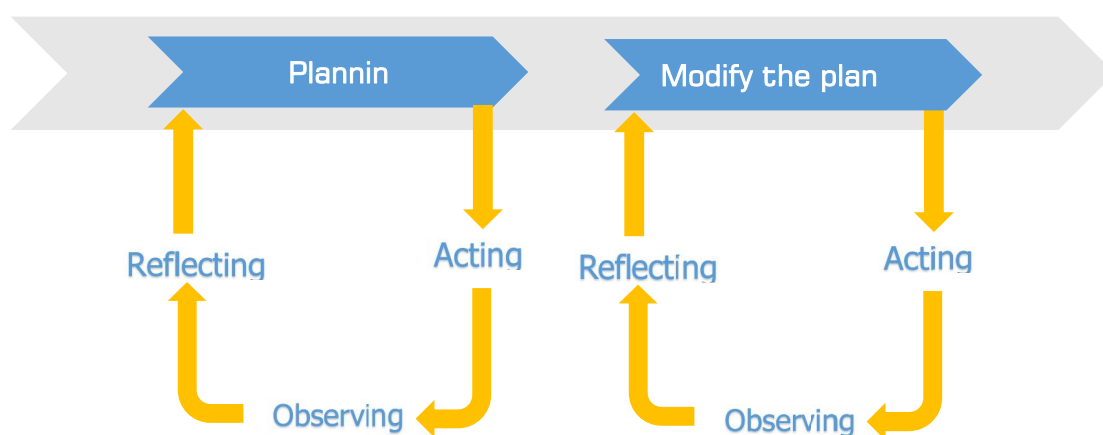
"Research for action" states that the purpose of action is to solve the problems encountered by practitioners in real work situations. "Research in action" points out that the research environment is that of the actual worker, not a deliberately arranged and controlled scenario. "Research by actors" refers to the fact that the main subject of action research is the actual worker, while the experts provide advice and counsel. It is a field research method oriented towards solving certain practical problems, based on practical experience, carried out in a collaborative manner between team members, and which demonstrates its usefulness and effectiveness in a dynamic environment, either immediately or within a relatively short period of time. This also highlights its advantages of timely feedback,

quick results and ease of application, an advantage that is quite suitable for applied research in classroom teaching based on the information technology environment.

Furthermore, in terms of the scope of application of the action research approach to educational technology, it is applicable to research in the following areas(Xie & Li, 2017, p. 209):

1. research on the construction of new teaching models
2. research on the innovation of teaching methods
3. Research on the design and development of quality resources
4. research on the design and development of new curricula
5. Research on students' personality development and ability enhancement
6. Research on the professional development of teachers
7. Research on the reform of school management
8. Others

Finally, in terms of the research methods and operational process of action research, it mainly uses daily observation, interviews, notes, case studies and questionnaires and is a spiralling cycle of development towards the overall goal throughout the operational process. Many scholars have proposed operational models of action research, such as D. Ebbutt's (1985) and Elliott's (1991) operational models of action research. In general, however, the process of action research is a deepening spiral with four interconnected and interdependent links in each spiral: planning, acting, observing and reflecting(Burns, 2010, p. 9).



Among the actions, planning refers to the development of research objectives and test subjects based on teaching needs. Acting mainly include teacher training, instructional design research and classroom practice. Observation is carried out mainly through pilot study diaries, video recordings of pilot lessons and classroom notes. Reflecting involves analysing the videos, summarising the stages, identifying problems and strategies for improvement. When the first round of trials is completed, new research objectives, tasks and plans are drawn up to start a new round of trials based on the results of the reflection.

After observing various cases of action research, two main modes of application of action research can be broadly summarised:

1. the step-by-step approach application model: first define a general objective of the research, and gradually achieve the general objective after several rounds of action research with continuous observation, reflection and improvement.
2. Breaking Large into Small model: Again, a general objective is set, which is then broken down into several sub-objectives, with each round of action research gradually completing a small objective to achieve the general objective.

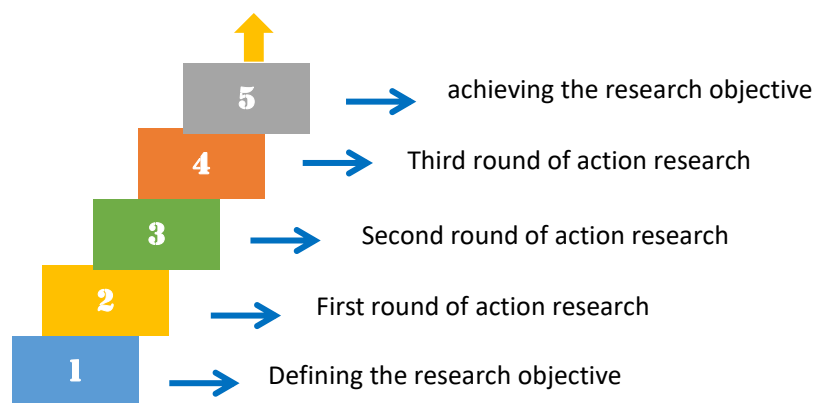


Figure 1: the step-by-step approach application mode

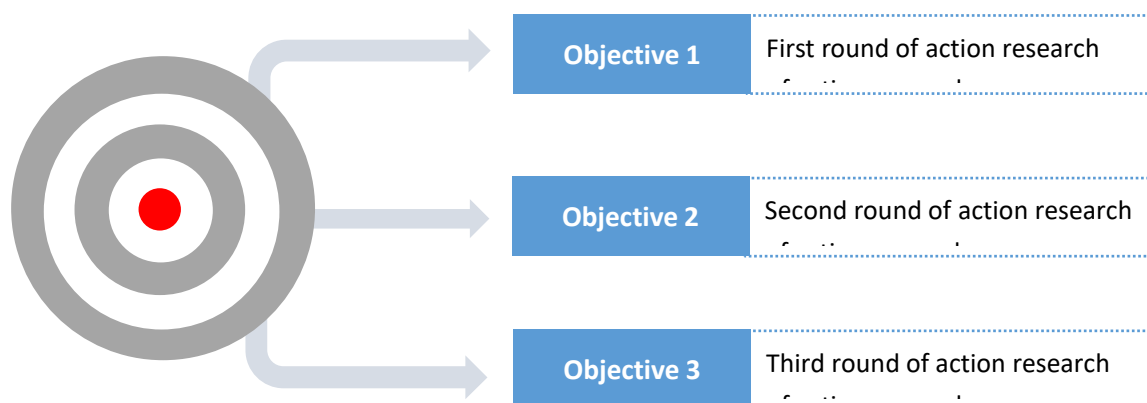


Figure 2: Breaking Large into Small model

In the context of the information age, the role of the teacher, the role of the learner, the learning materials, the learning environment, assessment and testing have all undergone a great transformation. There is great research value and scope for conducting research on the innovation of English teaching models and the enhancement of students' abilities in this field. My research is dedicated to the study of the improvement of English learning ability and the innovation of English teaching models for first-year practical English majors in an information-based environment where action research is a suitable method for general research, taking into account my research direction and real-life conditions. This is a dynamic study that needs to be carried out over a long period of time, because the object of my research is the classroom activities of teachers and students in real-life situations, and the goal of the study is to improve students' abilities through improved teaching strategies and innovative applications

of teaching models. I will therefore use the first model to carry out my research. I will go to the actual classroom setting to observe and identify problems, discuss with the classroom teacher to develop teaching objectives, teaching strategies and innovative teaching models, and then carry out no less than two rounds of action research, reflecting and developing the next round of objectives and strategies at the end of each round until the overall objectives are achieved.

Of course, as action research also suffers from a lack of representativeness of the research results and a lack of strict control of the research environment, I will add some experimental research to each round of research to make up for its shortcomings as appropriate, so that the validity and reliability of the research results and research data can be more assured. **Experimental research** is an exploratory activity carried out in a typical environment or under specific conditions, using certain means of active intervention or control of the research subject according to the purpose of the research. Because experimentation allows for artificial control of the conditions involved, it allows one to observe situations that would not occur under natural conditions, thus extending the scope of the study, and also isolating a particular factor in order to analyse the effect of a particular factor (MacDonald & Headlam, 2008, p. 44). Because experimental research is easy to measure it enables more reliable findings to be obtained and can be repeatedly verified. Based on the above characteristics of experimental research the deficiencies and shortcomings associated with the use of action research can be compensated for to some extent.

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Appendix

Qualitative methods	Quantitative methods
Phenomenological perspectives Emphasis on hands-on activities to gain experience Human behaviour can only be understood through personal subjective experience Understanding is empathy Reliance on qualitative data	Logical positivism Emphasis on experimental methods to obtain data Only by getting rid of the subjective state can we understand the causal relationship of social phenomena Understanding involves distancing oneself from the subject Reliance on quantitative data
Synthesis Approach From part to whole Holistic view The internal structure of the face Understanding the process Assuming a dynamic reality	Analytical approach From the whole to the parts Component View External structure of the face Understanding the outcome Assuming a static reality
Inductive approach Use the observed material as a starting point Realising no thought into a view Exploratory, extended, descriptive Can generate hypotheses Outcome: description or hypothesis	Deductive approach Use the hypothesis as a starting point Realization carries out presuppositions Parsimonious, inferential, verification Hypothesis testing Results: Theory
Naturalistic observation Wide range of observations, but more diffuse Variables are not controlled, good for understanding the complex relationships of variables, but also easy to lose sight of the other Dominant in content, but tends to ignore form subjective, but strong explanatory power Close to reality, but takes longer	Manipulation and control Narrower but more focused observations Understands causal relationships between variables, but tends to simplify problems Attention to form, but tend to neglect content Objective, but weak explanatory power Shorter time required, but more artificial

Descriptive Naturalistic observation without distractions Summarising data for descriptive purposes Aimed at discovering patterns or regularities High validity, low confidence Low generalisability: case study	Inferential Controlled experiments Generalising data and making inferences Designed to test pre-existing hypotheses High confidence, low validity High degree of generalisability: multiple observations
Purposive Sampling Sampling by purpose of study, small sample The study of subjects is naturalistic, holistic and specific Survey uses open-ended interviews, participant observation, physical analysis Materials are field notes, subject's words and finally descriptive information	Random sampling Random sampling by norms, large sample Study of subjects is controlled, tentative, abstract Survey instruments are closed questionnaires, scales, experiments, structured observations Variables are controlled and the material produced is quantitative results are calculated using statistical procedures
Variable level plan Research level micro, issues emerge in the process Implementation steps are flexible, variable and broadly planned Research stages are evolutionary, can change and can be repeated and crossed several times	Clear hierarchical plan The research level is macro and the problem is defined in advance Implementation steps are structured and specific Research phases are clearly defined in advance and not to be violated
Ethical issues Great emphasis on ethical issues Researchers are in close contact with the person and influence each other Researcher tries to prevent subjectivity, interacts with the person and sees from the person's perspective Researcher is trained in humanities, anthropology	Ethical issues Relative lack of attention to ethical issues Researcher is independent of the subject Researchers consider their observations and analyses to be objective and authoritative Researcher has theoretical training and knowledge of statistics

action research

Definition

It is a self-reflective investigation by practical workers to improve the rationality and correctness of their practical work and to improve their understanding of the actual work and the situations they are in. (Carr & Kemmis, 1986)

Suitable for exploring specific problems of teaching and learning on a small scale, the aim is not to construct a theoretical system or generalise laws, but to address important practical problems in teaching and learning through action.

Highlighting the centrality of the practitioner/ researcher

Practitioners investigate their own problems in their own professional sessions

Practicality

Putting practical problem solving first

Questions from practice

Problem solving in practice

The aim is to improve practice

Practitioners can integrate with the researcher's scientific research

Combining professional aspirations with scientific rationality

Cooperative

Researchers get on the front line of teaching

Practitioners engage in the research process

Features

Openness

Under the guidance of the general objective, we always face new situations and problems in practice and make timely adjustments to the programme, even changing the topic and changing the direction.

Spiral development

Researchers receive timely feedback

Identify the problem

Preliminary investigation

Formulating a hypothesis

Planning the intervention

Taking action

Reflecting on the results

Re-questioning

Second hypothesis

Taking action

Taking action

round 1

round 2

Contrast

Experimental research

Distinction

Action research deals with naturally occurring groups rather than with controlled variables

Naturalistic research

Distinction

Action research is an attempt to intervene in one's own behaviour to bring about a desired change, unlike naturalistic research which is merely to portray and explain