

A Critique of Qualitative and Quantitative Research Methods and Their Application to the Action Research Design of ESP Writing Class

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There is no denying the fact that quantitative and qualitative research methods are widely and profoundly studied in both natural science and social science in nearly every field one can imagine such as demography, anthropology, psychology, political science, medical science, economics, education, history. Here in this article the focus will be on the research methods in education because a multifaceted critique of the educational quantitative research method as well as the qualitative one will, to a great extent, guide me to design my action research on ESP writing class. Therefore, this article contains two parts in which the two research methods are critically explained first, followed by their application to my research design.

Part One: A critique of qualitative and quantitative research methods

In educational research both quantitative and qualitative methods are adopted to help researchers answer their questions and advance their knowledge. To have a comprehensive understanding of the two methods is essential to conduct educational research in a way that is valued. So, in this part a critical multi-angled explanation will be made.

1. Quantitative research

Quantitative research is characterized by being highly objective and favored especially by social science researchers, which can be clearly seen in the following definitions:

“Quantitative research involves data collection procedures that result primarily in numerical data which is then analysed primarily by statistical methods. Typical example: survey research using a questionnaire, analysed by statistical software such as SPSS.”

(Zoltán Dörnyei, 2007, p.24)

1.1 Variable

In quantitative research, a variable is the key concept because it is the tool that the quantitative researchers use to describe the world they are studying. Burke Johnson gives a very sound explanation on the definition and classification of the vital term

“A variable is a condition or characteristic that can take on different values or categories” (2017, p.117).

Generally variables are what researcher are studying in their research and they can be divided into the following two types: quantitative variables and categorical variables, whose definition is presented by Burke with typical examples.

“A quantitative variable is a variable that varies in degree or amount. It usually involves numbers. A categorical variable is a variable that varies in type or kind. And a categorical variable usually “involves different groups.” (ibid). The examples shown in the table can clearly illustrate the definition of the two types of variables:

Quantitative Variables	Categorical Variables
Height	Gender
Weight	Religion
Temperature	Ethnicity
Annual income	Method of therapy
Most aptitude tests	College major
Most achievement tests	Political party identification
School size	Type of school
Class size	Marital status of parents
Self-esteem level	Student retention (retained or not)
Grade point average	Type of teacher expectation
Teacher-pupil ratio	Native language
Time spent on homework	Teaching method
Age	Personality type
Anxiety level	Learning style
Job satisfaction score	Type of feedback
Number of behavioral outbursts	Computer use (or not)
Reading performance	Type of reading instruction
Spelling accuracy	Inclusion (or not)
Number of performance errors	Problem-solving strategy used
Rate of cognitive processing	Memory strategy used
Dropout rate	Social class

Table 1 Examples of quantitative and categorical variable Burke Johnson (2017, p.117)

Burke also explains another important categorization for variables: independent and dependent variables that are virtually important in designing research. The following are their definitions:

“An independent variable is a variable that is presumed to cause a change to occur in another variable. Sometimes the independent variable is manipulated by the researcher...A dependent variable is the variable that is presumed to be influenced by one or more independent variables. The dependent variable is the variable that is “dependent on” the independent” (pp.118-119)

In a quantitative study, researchers will try to manipulate the independent variable in order to ensure the changes of dependent variables are caused by the independent variable although in educational background it is in most cases hard to realize.

Besides there are two variables that need to be known: intervening variable and moderator variable:

Intervening variable is “A variable that changes the relationship between other variables” (pp.119-120) and “*a variable that changes (i.e., moderates) the relationship between other variables*”. And “*moderator variable is a variable that delineates how a relationship changes under different conditions or contexts or for different kinds of people.*” (ibid)

These two definitions can be illustrated by the following examples: if we suppose that some learning strategy in learning English is an independent variable, low mark is the dependent variable, then the intervening variable can be bad performance in class. And an example for moderate variables will be like this: data analysis shows that there is no difference on students’ performance between face-to-face learning and blended learning. But when further analysis is carried out it is found that students with strong self-discipline performs better in blended learning and those who are weak in self-discipline perform better in traditional learning. Here students’

self-discipline will be the moderator variable.

Being clear about the key concept of all kinds of variables, the quantitative researchers can make experimental (often quasi-experimental in educational context) research to explore the cause-and-effect relationships among variables. A brief procedure of experimental quantitative research can be described like this: the researcher manipulates the independent variable, which means designing the experimental conditions so as to ensure that the changes of the dependent variables (effect) is just because of the changes of the independent variables. (cause). Although it is the most convincing research methods in proving the cause-and-effect relationships, the researchers find it very difficult to manipulate the variables because in the real educational conditions there are many extraneous variables that confound the result. For example, a research is carried out to study how a specific teaching method affect the students' vocabulary. although he sets up two groups of students with one group using the teaching method and the other not, it is still not certain whether the results are due to the teaching method or anything else such as age, the difference of the students' vocabulary before the experiment or even other elements the research never know. So, the best way to solve the problem is random sampling.

1.2 Random sampling and data analysis

Random sampling, superior to nonrandom sampling, is the ideal way in experimental research and also the basis of doing quasi-experimental research. According to Burke Johnson (2017), there are four kinds of random sampling, namely, simple random sample, systematic sample, stratified sampling and cluster sampling, among which simple random sample is the foundation. For simple random sample, random number generator (www.randomizer.org) can be used to generate sample needed; systematic sample depends on sampling interval to generate samples; stratified sampling is carried out by dividing the population in two mutually excluded groups such as males and females, class1 and class 2, and then simple random sample or stratified sampling is used; cluster sampling is usually used in a very large research population in which clusters rather than individual subjects are randomly selected.

With the well-controlled variables and samples quantitative research is convincing in explaining research hypothesis, which is called data analysis. Quantitative research generally uses statistics to describe research questions, which is either descriptive statistics or inferential statistics.

“In descriptive statistics, the goal is to describe, summarize, or make sense of a particular set of data.” while “The goal of inferential statistics is to go beyond the immediate data and to infer the characteristics of populations based on samples”

(Burke Johnson, 2017, p.1025).

1.3 Validity and Reliability

The last but not the least, validity and reliability should be taken into account all the time that can even determine the value of the research, this can be supported by the following definitions:

“Reliability and validity, in research, refer specifically to the measurement of data as they will be used to answer the research question. The data you collect will only be as good as the instrument you use to collect it, and your goal is to have accurate data that represents exactly how your study participants” (Wood et al, 2006, 198)

In general, no matter how careful the quantitative research is carried out the difficulty in manipulate all the possible variables as well as sampling makes many educational researchers be reluctant to make the quantitative research in their field of study. For example, Waitzkin (1990) states that quantitative methods are not ideal in analysing social, political, economic and historical discourse and it is hard to find the underlying themes and structures through quantitative research.

2. Qualitative research

Compared with the quantitative method, the qualitative method differs in many aspects. This can be briefly seen from its definition in which non-numerical data is collected and analysed through textual information rather than statistics. So, qualitative researchers' task is to explore or discover a phenomenon as it naturally occurs rather than test a hypothesis by manipulating variables because qualitative researchers think that dynamic and changing human behaviour should be observed in depth over a long period of time to find the truth.

“Qualitative research involves data collection procedures that result primarily in open-ended, non-numerical data which is then analysed primarily by non-statistical methods. Typical example: interview research, with the transcribed recordings analysed by qualitative content analysis.”

(Zoltán Dörnyei, 2007,p.24)

2.1 Major types of qualitative research

In qualitative research, there are five major types that are usually used, namely, phenomenology, ethnography, grounded theory research, case study research and narrative inquiry, whose definitions are quoted from the authoritative scholars in education.

“Phenomenology refers to the description of one or more individuals’ consciousness and experience of a phenomenon.... The purpose of phenomenological research is to obtain a view into your research participants’ life-worlds and to understand their personal meanings constructed from their “lived experiences.”

Burke Johnson (2017, p.921)

Ethnography is

“a form of qualitative research focused on discovering and describing the culture of

a group of people.”

Burke Johnson (2017, p.933)

“Grounded theory is a general methodology for developing theory that is grounded in data systematically gathered and analyzed”

(Strauss & Corbin, 1994, p. 273).

Case study research

“provides a detailed account and analysis of the characteristics and dynamics present in one or more cases.”

(Burke Johnson, 2017, p.897)

Narrative inquiry is the study of experience as a story by which people interpret their past. (Connelly & Clandinin, 2006) And this definition is further explained like this:

“Framed within this view of experience, the focus of narrative inquiry is not only on an individual’s experience but also on the social, cultural, and institutional narratives within which individuals’ experiences are constituted, shaped, expressed, and enacted. Narrative inquirers study the individual’s experience in the world, an experience that is storied both in the living and telling and that can be studied by listening, observing, living alongside another, and writing, and interpreting texts”

(Clandinin and Rosiek, 2007 pp. 42–43).

From what has been cited it is very clear that each of the five major qualitative research methods are different although they are all qualitative in nature. For example, ethnography focuses on the culture of a group of people while case study is about a very deep exploration of one or more (but not many) cases. Grounded theory is rooted in the data to generate theory which is quite different from the first two. As for narrative inquiry, doing research through story-telling makes it distinct and phenomenology aims to understand how to experience a phenomenon by participates,

for example, how do children experience the earthquake.

However, it is because of the focus on attitudes and feelings of human beings, qualitative research is often criticized as being weak in the quality of interpretation and the textual presentation. So, no matter which specific approach is used in the qualitative research, the most important point that should be taken into consideration is the rigour of the research design.

2.2 Three types of rigour in qualitative research

According to Frances Ryan, et. al (2007) “*Rigour is the means of demonstrating the plausibility, credibility and integrity of the qualitative research process*” (p.742). And they summarize Burns and Grove’s three aspects of rigour in qualitative research, namely, rigour in documentation, procedural rigour and ethical rigour. In brief they are concerned with the following aspects of research design: First, the research process should be correlated with the questions. In other words, the process of the research is aimed at answering the research questions. Second, data collection should be appropriate. To be more specific, most qualitative research use purposeful sampling to ensure the richness of data for in-depth study (Cynthia K Russell, 2003). Purposeful sampling is a technique of collecting qualitative data by selecting knowledgeable and experienced participates based on their willingness to participate and communicate in a reflective way (Lawrence A Palinkas et al., 2013). In qualitative sampling although the participates are generally small compared with those in quantitative sampling, saturation should be ensured, which means sampling cannot be stopped until no new substantive information is added in the process of data collection Frances Ryan, et. al (2007). Third, to keep the participates confidential as they are willing to is not only the ethical requirement, but also a guarantee to encourage the participates provide as much useful information as possible.

In addition to vigour in the above-mentioned aspects, it should also be reflected in data analysis that is “fundamental to determining the credibility of the findings”, and therefore “sufficient description” of the whole process of how the data are

analyzed is vital to ensure the credibility. (Ryan, Coughlan & Cronin, 2007, p.742).

3. Comparison between quantitative research and qualitative research

As indispensable tools to doing research, the two critical research methods have already been compared by researchers in every possible detail to help researchers make informed decision while designing their research such as their theoretical origin, methodology including sampling, data collection, data analysis, validity and reliability of quantitative instrument and rigour in qualitative study:

Zoltán Dörnyei (2007) puts forward three aspects of difference between qualitative and quantitative research: First they are based on different ideology; Secondly, data collected are essentially not the same; And thirdly, the way the data are analyzed and reported varies.

R. Burke Johnson (2017) explains in more detail the two research methods in terms of six key differences: Firstly, Quantitative research “*focuses on hypothesis testing and theory testing*”, (p.108) and qualitative one “*describes what is seen locally and sometimes to come up with or generate new hypotheses and theories*” (p.108); Secondly, different views of human behaviour contribute to different ways of research. Holding the view that “*cognition and behavior are highly predictable and explainable*” (p.109), quantitative researchers try to find out causes to help them “*make probabilistic predictions and generalizations*” (p.109). However, regarding human behavior as “*being fluid, dynamic, and changing over time and place*”(p.111), qualitative researchers are eager to “*construct realities or perspective* ” (p.111) to show how they see, understand and act rather than make generalization; Thirdly, in quantitative research only one or a few causal factors are studied by virtue of making those factors being not studied constant like laboratory experiment while qualitative researchers examine human choice and behavior as they naturally happen and study them holistically; Fourthly, quantitative researchers believe in objectivity, which means they try to “*remain as neutral or value-free as they can*” (p.112) in order to “*avoid human bias*”. While, qualitative researchers argue that “*reality is socially*

constructed" (p.112) and therefore the subjective dimensions of the social phenomenon should be studied; Fifthly, quantitative research collect data through such instruments as questionnaire and use numerical data to analyse while qualitative data are usually words from observations and interviews; And finally, how to report the results of the research varies between the two methods. In quantitative research, numbers and statistical significance testing are reported while in qualitative research it is "written in narrative form" and "lives and experiences and language of the participants" are illustrated. (p.114)

From what has been discussed above, we can know clearly enough that the reasons why these two research methods vary in so many aspects are that they arise from different philosophical roots, which is worth exploring so as to better understand them. Michael Crotty(1998)'s explanation on four elements of social science can give us a clearer overview, as is shown in the following table:

Epistemology	Theoretical perspective	Methodology	Methods
Objectivism Constructionism Subjectivism (and their variants)	Positivism (and post-positivism) Interpretivism • Symbolic interactionism • Phenomenology • Hermeneutics Critical inquiry Feminism Postmodernism etc.	Experimental research Survey research Ethnography Phenomenological research Grounded theory Heuristic inquiry Action research Discourse analysis Feminist standpoint research etc.	Sampling Measurement and scaling Questionnaire Observation • participant • non-participant Interview Focus group Case study Life history Narrative Visual ethnographic methods Statistical analysis Data reduction Theme identification Comparative analysis Cognitive mapping Interpretative methods Document analysis Content analysis Conversation analysis etc.

Table 2 Representative Sampling of Four Levels of Category (Michael Crotty, 1998, p.14)

Based on the description of methodology and methods it is not difficult to find the link between the specific methods and methodology and the related theoretical foundations including epistemological roots and theoretical perspective he mentions. Epistemology is, as cited by Michael Crotty , "*a philosophical grounding for deciding*

what kinds of knowledge are possible” (pp.16-17). In other words, it *"deals with the nature of knowledge"* (pp.16-17). In this table three epistemology stances are mentioned as examples, namely, objectivism, constructivism and subjectivism. Objectivism emphasizes "meaningful reality" without being influenced by consciousness. for example, the trees-ness of a tree in a forest exists no matter people are conscious of it or not. On the other hand, constructionism denies objective reality and the truth can only be found in the process of interacting with the outside world. So, *"meaning is not discovered, but constructed"* (p.17). As for subjectivism, unlike constructivism that advocates interaction between subject and object, subjectivist epistemology believes that *"meaning is created from nothing"* (p.17), which is, in fact, not from nothing but from somewhere else such as dreams, or religious beliefs, or collective unconscious.

Then can we say that the quantitative method is based on objectivism while the qualitative method derives from constructionism and subjectivism? Indeed, it is not the case:

"The divide-objective research associated with quantitative methods over against constructionist or subjectivist research associated with qualitative methods-is far from justified." (p.24)

This is best illustrated by the early study of ethnography that was carried out "in an utterly empiricist, positivist manner" (p.24). In fact, the influence of positivism in the social and psychological sciences remained dominant until the 1950s. (Burke Johnson, 2017). So, it is quite hard to say either quantitative or qualitative methods are strictly based on specific theoretical roots, let alone theories, no matter epistemological or specific theoretical perspective, which are also progressing and overlapping. However, there is no denying that exploration on the theoretical roots of the two research methods are still necessary for better understanding. Just as Burke Johnson (2017) mentioned each current qualitative research methods reflects the idea of poststructuralism and postmodernism that emphasize on uniqueness in the dynamic

and complicated society.

Although quantitative-qualitative distinction is obvious just like what has been discussed above, there is no need for educational researchers to fear the integration between them because there exists no incompatibility not only in practice or in epistemology (Kenneth R. How, 2016). In fact, a mixed method is now widely advocated by researchers. For example, R. Burke Johnson (2017) evinces that before the 1980s, quantitative research method was generally preferred by educational researchers and the debate on the superiority of the two methods summited in the 1980s. Some researchers assert that owing to the differences in the worldviews and philosophies, they cannot be used together. but more researchers nowadays contend that it is not true since so-called qualitative research today have been carried out in positivist way and vice versa.

“The mixing of ideas and approaches has been present throughout history because mixing or combining builds upon what we know and offers new ways to understand and study our world.”

(R. Burke Johnson, 2017, p.105)

Waitzkin (1990) also puts forward several criteria to compromise the two methods such as discourse selection by sampling, multi-reviewed recordings, standardization of transcription rules, multi-assessed transcription, theoretically-based and multi-reviewed interpretation procedure. So does Joannae E. M. Sale, et.al (2002) who advocates mixed-methods research by saying that the two methods can be combined by making use of the advantages of each method so as to have a more comprehensive analysis of the phenomenon studied. I am personally for the mixed method approach in my own research that will be expounded in part two.

Part Two: Application of the two research methods to the action research design of ESP writing class

In the past five years I have been teaching ESP Writing in which both EAP and EOP related text types were taught for their future study and career such as the abstract of articles, a job application letter and a letter for study admittance to overseas universities, CV and diagram description. In my teaching experience I have met a lot of difficulties which can be mainly listed as follows:

- 1) Reading and writing practice are not enough due to the limited time in class.
- 2) With at least 4 classes and 40-60 students for each, many activities cannot be carried out such as the challenging and time-consuming tasks, extended learning activities, more feedback and collaboration in learning.
- 3) The traditional lecture-focused class with extracurricular writing tasks cannot arouse students' interest because there is little chance for them to discuss with the teacher about the questions, they meet in dealing with the assignment after class, neither do they have access to effective peer feedback.

So how to redesign the class to effectively solve the problems above mentioned motivate me to do a research in which a blended learning is going to be chosen as a possible solution to the problems in the teaching and learning because the positive influence of blended learning has been proved by previous studies. For example, according to Yulia (2017) face to face learning environment provides more opportunities for social interaction that students need to guide them through learning and online learning environment provides the flexibility of time and place which is not possible in face-to-face learning. Also, Wasoh (2014) holds that online learning creates a student-centered learning environment, enables participants to have more flexible time and place of learning, and improve access to learning materials.

From what have been discussed above, it is clear to see that with part of contents possibly being dealt with on line for the students, which gives them freedom to study and reflect whenever and wherever they like under instruction, there will be more

time and energy for the teacher to design the face-to-face discussion and collaboration. However, designing a course is not a simple addition of online learning. Instead, it needs to be studied based on conceptual, theoretical framework exploration as well as a well-structured assessment to the design. This research will be an attempt to fulfill this.

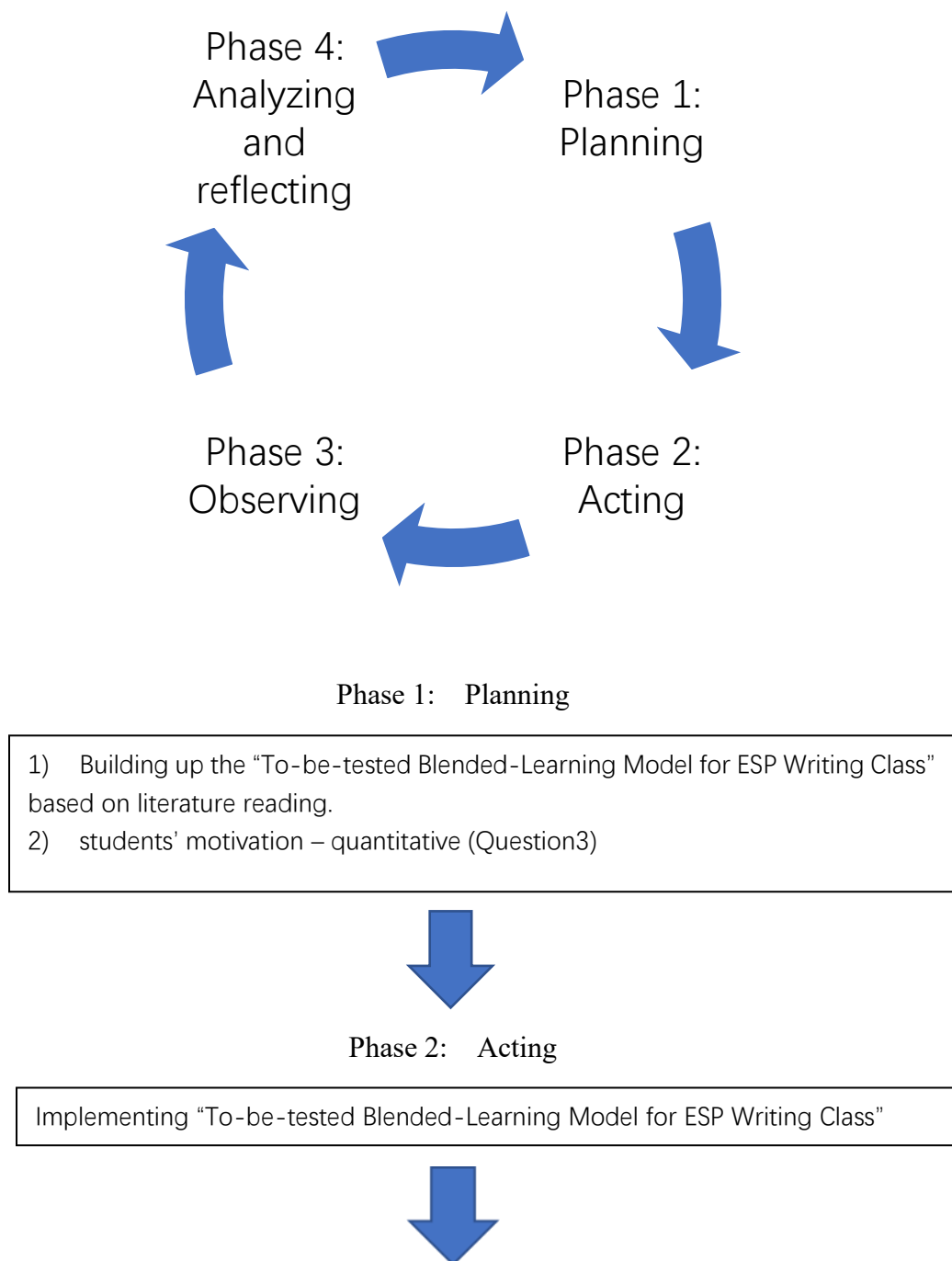
1. Overview of the action research proposal

The whole research plan can be briefly described like this: first, to build up a “To-be-tested Blended-learning Model for ESP Writing Class” based on conceptual and theoretical exploration; second, to carry out an action research testing the effectiveness of the new class design with both qualitative and quantitative methods; third, to modify the to-be-tested model based on the action research and put forward the “Verified Blended-Learning Model for ESP Writing Class” to solve the three problems arising in the process of teaching and learning. To be brief, the To-be-tested Model for ESP Writing Class is built up based on Randy Garrison’s Community of Inquiry Model (CoI), one of the most influential framework for Online Learning Research is Community of Inquiry Model (CoI) (2008) that constitutes three core interactive elements: cognitive presence, social presence, and teaching presence and Merrill’s First Principles of Instruction (2002), which consists of five first principles of promoting learning, namely, when learners are engaged in solving real-world problems, when existing knowledge is activated as a foundation for new knowledge, when new knowledge is demonstrated to the learner, when new knowledge is applied by the learner and when new knowledge is integrated into the learner’s world. The five principles are realized in four distinct phases: (a) activation of prior experience, (b) demonstration of skills, (c) application of skills, and (d) integration of these skills into real-world activities. The first principle gives a guideline in designing courses with its logic sequence of stages and clear principles. Then an action research which aims at testing the effectiveness of the To-be-tested Blended-Learning Model for ESP Writing Class in solving the three problems are carried out through four phases: (1) planning; (2) acting; (3) observing; and (4) reflecting, which will be further explore in

the next part.

2. Research Design based on study of the two research methods

Generally speaking, this research focuses on mixed research methods that are used in action research:



Phase 3: Observing

Collecting data - qualitative (Question 1 and 2)



Phase 4: Analyzing and reflecting

Analysis data - model revision

As is shown in the diagram above, both quantitative and qualitative methods are used in the action research that attempts to solve the problems in the actual teaching setting. The research question 3 is about how to enhance the interest in the teaching.

In phase one, quantitative research will be used to analyze factors that demotivate students. Questionnaire of demotivation based on literature review and experience in teaching will be made. There are about 5000 students in the university so cluster sampling is used to finish the questionnaire. Based on the literature review of blended learning and results of quantitative study that find factors causing students' demotivation, 'To-be-tested Blended-Learning Model for ESP Writing Class' is constructed.

In phase two, implement the model in class and make qualitative research. To be specific, grounded theory will be used to have a comprehensive account of students through their narrative, assignments, recordings of the class, textual communication online, classroom observation etc. purposeful sampling is used to explore research question 1 and 2. In order to ensure diversity of participates, comprehensive sampling will be used to explore as much as factors possible.

Phase3 is to collect qualitative data and analyze them. those data concerning narrative, recording, textual communication is coded and key concept rooting from the data will be generated to modify the model so as finally to answer question 1 and question 2.

Phase 4 is to reflect the result and prepare for next term of teaching with new questions found in the qualitative research.

In conclusion, the application of mixed research methods based on the detailed analysis of quantitative and qualitative research method to the research of my interest can improve the value of it although far more scaffolding on each specific stages in practice need to be clarified.

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