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

Introduction

In a critical research article, research methodology should be legally manifested. "Research methodology is a specific procedure or technique used to identify, select, process and analyze information about a subject. In the research paper, the methodology section allows readers to critically evaluate the overall effectiveness and reliability of the research (Opoku, et al., 2016)". For most researchers, choosing the right research method becomes one of the decisions that needs to think through because it is difficult and confusing. The research types are likely to determine the correct research method, and the research and the data collection methods used should be consolidated. No matter what research methodology is chosen, the data collection technology used has to be fit and able to meet the research goals. There are diverse means to collect the research data. In the socio-cultural range of research, the data is usually collected of words or numbers, which is most properly to be qualitative data and quantitative data. According to Streefkerk (2019)'s definition, quantitative research is represented by numbers and graphs. It is used to prove a theory or hypothesis to be true or less true. It usually to be used to build generalizable facts about a topic. Popular quantitative methods include experiments, digitally recorded observations, and closed question surveys. While qualitative research is shown in words, which is used to elaborate concepts, ideas or experiences. We can acquire basic insights into topics that are not well understood. There are also some common qualitative methods, such as open-ended question interviews, observations interpretation, and literature reviews that rolls out the theories and concepts. The choice of research methods depends on what the research wants to achieve. For example, to investigate the employee's perceptions of their direct manager in a company, the primary goal is to investigate if there are distinguishable difference of the views towards manager in different branches and department location. The second aim is to gather the helpful feedback and learn about the new ideas that the employee could suggest to advance the management. Thus, quantitative method and qualitative method should work together to get the most powerful results. Based on my understanding, qualitative research mainly links to the social problems and revealing the situation. And it is to understand the facts, analyze the views and actions of human by explaining through in-depth analysis of the development process and identify the natures of society. Quantitative analysis refers to mathematics Based on the method, the development trend is analyzed, predicted and explained by studying the characteristics, relationship and changes of quantitative of social phenomena. In this essay, I would like to make judgement about qualitative research and quantitative research and clarify how I would approach my research topic with the help of these methods.

Main body

Before starting the data collection process, to determine exactly what is or are the research aims is necessary. Figuring out what is the actual or scientific problem are waiting to be solved and the reason why it is important. Then develop the research questions that wanted to find. Depending on the research questions, data is needed to be collected. As mentioned before, quantitative and qualitative data are expressed in different ways, If the goal is to test a hypothesis, measure something accurately, or gain large-scale statistical insights, collecting quantitative data is more appropriate. If we hope to explore thoughts and learn experiences, or acquire detailed insights into specific environments, qualitative research method is helpful. When there are multiple goals, mixed methods to collect these two types of data are needed.

Qualitative research

Definition: Qualitative research basically is a research referring to "in-depth, detailed and long-term research on social phenomena using methods such as field experience, open interviews, participatory and non-participatory observations, document analysis, and case investigation in the natural environment" (Mills and Birks, 2014). Qualitative research focuses on the step-in in the analysis method and collecting the front information at the time, learning about the meaning of the participants' belief and behavior on objectives from their perspective, and then to build up hypotheses and theories on this basis, and passing falsification Methods such as methods and related inspections are used to test the research results. At the same time, because the researcher himself is the main research subject, the influence of his personal background and the relationship with the researchers on the research process and results must be considered. Moreover, the research process is an indispensable part of the research results, which must be recorded and reported in detail. The theory formed by the qualitative research method is generated from the interrelationship among the many different evidences collected, which is a bottom-up process. (Mills and Birks, 2014) The most popular qualitative methods are interviews, focus group discussions, participant observation and content analysis. (Editage insights, Online) No matter what form is adopted, in the process of qualitative research, three main steps must be mastered: planning, execution, analysis and application. Having mastered these three key points, the entire qualitative research will have a successful foundation.

Advantages of qualitative research

- a. Suitable to observe and study people's attitudes and behaviors under natural conditions;
- b. The validity of the study is high;
- c. The method is more flexible and flexible;
- d. Suitable to study the process and characteristics of the development and

change of phenomena;

e. The research focus can be adjusted in time according to the progress of the research;

f. Most suitable for exploratory research.

Disadvantages of qualitative research

a. The generality is poor, and the overall cannot be inferred;

b. Low reliability;

c. Easily affect the research object;

d. Longer time required;

e. Prone to ethical issues;

f. The research results are greatly influenced by the experience and ability of the researchers. (Rahman, 2020)

Quantitative research

Definition: Quantitative research refers to the prescriptive scientific research that determines the quantity of a certain aspect of a thing. It is a research method and process that uses quantity to express problems and phenomena, and then to analyze, test, and explain to obtain meaning. Quantitative means to measure based on digital symbols. Quantitative research measures the value of the characteristics of the object by comparing the characteristics of the research object according to a certain standard, or finds the change law of the quantity between certain factors. Since its purpose is to answer the properties of things and the quantity of their movements, it is called quantitative research. Quantitative research is closely related to scientific experimental research. It can be said that scientific quantification is accompanied by experimental methods. (Jayaratne, 1993). There are mainly four types of quantitative research, which are "survey, correlational research, casual-comparative research and experimental research." (QuestionPro, online)

Advantages of quantitative research

a. Quantitative research is able to take both description and explanation purposes into consideration;

b. In the operation process, quantitative research is relatively strict and standard, which makes the research results more reliable and the description and generalization turn out to be more accurate;

c. Quantitative research could be able to provide rich data and detailed information quickly and efficiently, and it is sufficient in understanding and acknowledging constantly changing social phenomena;

d. The quantitative characteristics has the function to locate the precise information in a broad range, with the main influencing factors can be found through statistical analysis;

e. The research results of quantitative research can be used as a basis for decision-making because it is mostly accurate and objective and it could also provide meaningful tracking and comparison. Through statistical analysis, the main factors affecting attitudes can be found.

Disadvantages of quantitative research

- a. Reliability and validity are comparatively low;
- b. The collected data is superficial, which may lead to a weak analysis;
- c. The content cannot be changed during the research process;
- d. Time and energy consuming and relatively high cost;
- e. Low change to be controllable;
- f. The profound cause and effect relationship cannot be dug out. (Rahman, 2020)

Comparison between qualitative method and quantitative method

Choy (2014) Proposed the main distinction between qualitative approach and quantitative approach. Quantitative research and qualitative research are two opposing research paradigms in the field of social sciences. Both have obvious differences in research goals, objects and methods.

In terms of research objectives, quantitative research emphasizes predictive control and qualitative research emphasizes the understanding of meaning; secondly, quantitative research emphasizes the objective reality of facts while qualitative research emphasizes the subjective intentionality of objects; third, in terms of research methods, the difference is:

a. Different focus

Quantitative research focuses on the quantitative aspects of things; qualitative research focuses on the material aspects.

b. Different levels in the research

Quantitative research is for more accurate qualitative research.

c. Different basis

Quantitative research is mainly based on actual data obtained from surveys, while qualitative research is based on a large number of historical facts and life experience materials.

d. Different means

Quantitative research mainly uses methods such as empirical measurement, statistical analysis and model building; qualitative research mainly uses methods such as logical reasoning and historical comparison.

e. Different subject foundation

Quantitative research is based on probability theory and social statistics, while qualitative research is based on logic and history.

f. Different forms of conclusion

Quantitative research is mainly expressed by data, patterns, graphics, etc.; qualitative research conclusions are mostly written descriptions. Qualitative research is the basis of quantitative research and its guide, but only when quantitative research is used at the same time can it be accurately qualitatively based on accurate and quantitative basis. As far as I concern, the basic difference between quantitative research and qualitative research has more attributes. They are "types of questions asked, types of data collection instruments, forms of data they produce and degree of flexibility" (Online). on

types of questions asked, qualitative methods are normally open-ended questions, while the questions of quantitative methods are closed-ended and fixed; on data collection instrument, qualitative methods usually work with the semi-structured ways such as interview and focus group, while tightly structured methods such as questionnaires are used; On the data producing, descriptive data makes of the form of qualitative, while numerical data are as the form of data produced; as to the flexibility degree, Participant reactions will affect how and what questions the researchers ask at the next step to collect qualitative data, while the participants response in the quantitative data collection will not influence the procedure.

Mixed method

Reichardt and Rallis (1994) discussed in their research, that "qualitative analysis and quantitative analysis are both opposed and unified, and complement each other. Qualitative analysis is the basic premise of quantitative analysis. Quantitative without qualitative is blind and worthless. Quantitative analysis makes qualitative analysis more scientific and accurate, and it can prompt qualitative analysis to draw broad and in-depth conclusions." That is to say, although qualitative method and quantitative method have difference, they are not supposed to be seen as entirely divided when conducting a research. Mixed methods sometimes carry out the double effectiveness.

According to Song and Pan (2010), there are various benefits of the mixed methods. First of all, mixed methods provide multiple inspections. For the same phenomenon of inquiry, through mixed research to collect qualitative and quantitative data for analysis, two sets of result. Through the similarities and differences of the two sets of results, the respective research conclusions are compared and mutually checked to avoid single method bias, to achieve the purpose of multiple checks or cross validation. Due to different methods. If the two sets of results are similar (different methods), the research findings or evidence are mutually antagonistic but cooperative to get the same evidence), which can provide stronger support for research conclusions and increase the validity of conclusions or theoretical constructs; if two sets of conclusions are inconsistent, it is possible that the researcher should adopt a more conservative conclusion statement in the overall research conclusion, or may re-examine the problem or the theoretical viewpoint behind it, even further examine the applicability of the research method, re-collect information, and carry out another round of scrutiny (Creswell and Plano, 2007). For example, Graue, Rauscher, and Sherfinski (2009) adopted a sequence-mixing research design to understand whether the interaction between teachers and students is possible in a small-class teaching environment, improving the quality of education. Among them, the collection of quantitative data adopts the scoring system. Scores are given for different teaching aspects, while qualitative data is scored

Analyze field observation records of teaching activities in each class.

Comparing the classroom teaching quality scores measured by CLASS and the field observation records integration can fully describe the teaching situation and quality of small classes, and mutually verify the correctness of the materials. Second of all, mixed methods could make complementary of the qualitative data and quantitative data. Both qualitative and quantitative research methods have their own advantages and disadvantages, and they can make up for each other's shortcomings when used at the same time. The assumptions of the design are more rigorous. Generally, the correlation or causality between the variables is explored through appropriate sampling. The results are also expected to be universal; and the characteristic of qualitative design is to make more in-depth and comprehensive contact with the objects of inquiry, and advance. It constructs a personal understanding and interpretation of the object being explored. The orientation and purpose of the two are different, and the importance of the same research phenomenon overlapping or different facets are understood differently, which enriches and refines the results of the exploration of phenomena. The difference between complementarity and reinspection is that multiple verification emphasizes that the phenomena explored by the two methods are the same and the questions to be answered are the same. The results may also have a competitive and cooperative relationship. But complementary functions may explore different aspects of the same phenomenon. The questions answered may not be the same, and the results are expected to be cooperative. For example, when evaluating the effectiveness of a museum's mobile navigation, quantitative method can be used to understand whether visitors with mobile guides spend a long time interacting with the exhibits, but also through interviews to understand the feelings of visitors who use the action guide when interacting with the action guide and whether their motivation to visit has improved. Both the time and the experience of the visit are different aspects of the exploration phenomenon (the benefit of the action guide), and it is more helpful to integrate the two and understand the overall phenomenon of concern. Another example is to explore a physics myth concept to change the curriculum. The effect is measured by achievement test to compare the progress of students' scores before and after participating in the course; and qualitative interviews are used to understand conceptual changes. The process of learning is also an example of deeper exploration of the same phenomenon (curriculum effect) through different aspects of the results. Thirdly, mixed methods are stepping-stone. In the process of performing two qualitative or quantitative studies at different times, the results of the first study serve as the basis for the second study, providing necessary reference information to assist the second study in making certain research steps. For example, it is necessary to compile a Chinese reading motivation scale with local characteristics, but since I do not know whether the connotation and orientation of Chinese reading motivation are the same as those in the Western literature, first use grounded theory to understand Chinese reading motivation and obtain relevant information. After the dimension, the

topic is prepared and the factor analysis is performed as the verification of the dimension. Also, if you want to understand the history and causes of students' Internet addiction, first use the Internet Addiction Scale to investigate the subjects to obtain information on students with different Internet addiction levels, and then take a sample based on this information, and then conduct in-depth interviews to understand the course and causes of addiction among students with different addiction characteristics. Clarification is the last advantage of mixed methods. In the process of performing two qualitative or quantitative studies at different times. The purpose of the second study is to clarify and explain the unclear or unexpected results of the first study; or the first study is not complete enough and the part is reinforced. The difference from the complementary function is that the clarified function is a demand that only occurs after the first study is completed, while the complementary function is planned in advance and then collects both qualitative and quantitative data. For example, at the beginning of a study, only the quasi-experimental method was used to examine whether a class receiving inquiry learning (inquiry learning) compared with a class receiving traditional teaching methods would get higher scores in the quantitative standardized natural science examination. When the research results and expectations are not the same, that is, when there is no significant difference in the performance of the two classes of students, the researcher can add a qualitative interview to clarify the quantitative results—select students with similar performance from the two classes to interview and compare The learning process of the two classes of students and in-depth exploration of why different learning environments did not cause differences in learning effectiveness. The choice of research method should be based on the purpose of the research and the nature of the question to be answered. The orientation of using mixed methods is not necessarily better than using a single method of orientation. When it is necessary to use a mixed methods method, it depends on whether the researcher needs to combine the two methods to achieve multiple verification, complementation, foundation laying, and clarification. (Song and Pan, 2010)

There are also benefits and downsides of mixed methods. Johnson and Onwuegbuzie (2004) summarized some advantages and disadvantages of mixed methods. For example, one of the dominating advantages of mixed methods is the words and pictures are able to be used as the number's supplementary and vice versa, numbers contribute to the accuracy of words and pictures. Additionally, thanks to the mixed methods, the research questions are allowed to be more sophisticated and broadly. Also, mixed methods permit the quantitative method and qualitative method to develop their own leverage and make up the shortages of each other's, which makes the research results more complete. However, according to Johnson and Onwuegbuzie (2004) as well, collecting quantitative data and qualitative data is more difficult and consuming, which means it cost more to collect data by mixed methods. Moreover, the researcher is necessary to have high knowledge of dealing with

the quantitative method and qualitative method and integrate the results properly.

There are directions that the mixed methods are supposed to be developed to. They are: the common academic community language for mixed research needs to be established; the execution procedure of mixed research needs to be deepened; the application benefits of mixed research need to be more clearly defined and the philosophical classics of mixed research need to strengthen its function of guiding research practice.

Justification of my research method choice

Regard as my research interest in the future, my primary research topic is 'An exploration of the feasibility of eliminating gender bias in English language education in universities'. The research aim is to figure out whether and to what extent that the feminism in English language is approached in class education and how the English language is gendered among teachers and students in the university. In this research, I would adopt mixed methods to gain the relatively precise result. Firstly, I may need to acquire the common attitudes of university students and teachers towards gender discrimination in language to test whether there is systemic injustice among the participants. On this goal, the questionnaire is an easier way to get the data. Because as listed above, quantitative method is suitable for the broad-scale and straightforward research targets, and questionnaire helps to deal with the situation that the participants are in great amount. I may invite 40-50 participants to finish the questionnaire. Secondly, the ways that the feminism in English language teaching in classrooms are supposed to be surveyed as well. This goal regards to the question "how", so the in-depth research method is required. I might invite 5-6 English teachers to be the participants. As I would like to process the details of the gender fair English language and how the specific experience and feeling that the teachers and students go through, I would adopt semi-structured interview and focus group discussion to gain the results. Moreover, in my opinion, document analysis might also be helpful. To be specific, I would access the documents about the culture and language relationship and the education rule and beliefs that the school design. Eventually, I believe the research goals could be achieved in a large degree.

Conclusion

To sum up, as discussed above, there is no way to decide a perfect research method when doing research scientifically, and there must be both ways that each method can work. Generally speaking, quantitative research methods are more objective and scientific, but it demands a higher level of mathematical knowledge than qualitative method. Qualitative research methods operate rougher, but to deal with the insufficient or the weak analyst's mathematical foundation, qualitative data might be more suitable. To me, in the research of 'An exploration of the feasibility of eliminating gender bias in English language

education in universities', I would adopt the mixed methods to integrate the advantages of qualitative method and quantitative method and adjust the research result to ensure the precise. Therefore, I may find appropriate ways help my research gain a relatively technical result and make constructive contribution for the further research.

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