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MIXED METHODS IN DEVELOPMENTAL RESEARCH

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ABSTRACT

Developmental research is widely used in instructional development which tends to use different data collection methods. The research questions of an instructional development study can be looked at from different angles and using different methods to approach its research questions. This paper presents an analysis of a developmental research study by Ma (2012), which comprised eleven research questions. Ma's study developed from Phase One: identifying the target group's current vocabulary learning strategies and vocabulary level, to Phase Two: identifying the characteristics of a vocabulary learning system, to Phase Three: designing a vocabulary learning module for Chinese EFL learners. Ma used a mixture of qualitative and quantitative methods to give the depth and breadth to the development of her instructional module. Ma's study is distinctively a developmental research employing a mixed methods approach.

Keywords: *developmental research, research questions, data collection methods, mixed methods*

INTRODUCTION

Conducting a developmental research to design an instructional manual for Chinese EFL learners requires careful navigation of uncertainties in a dynamic context. Firstly, the proposed intervention is mostly unknown beforehand. Secondly, the eventual success is highly dependent on the implementation process. Although there is a body of theoretically underpinned and empirically tested design principles and methods, the data collection has to be broad enough to be meaningful and instrumental for the development of a manual. The empirical feedback helps to determine the effectiveness of the manual (Akker, 1999).

Developmental research is pragmatic (Richey & Klein, 2005). It seeks to create knowledge grounded in data systematically derived from practice. It is a way to establish new procedures, techniques, and tools based upon a methodical analysis of specific cases. A developmental research project produces context-specific knowledge that addresses a specific problem.

Often developmental research occurs in natural work environments. The credibility of a developmental study is established by assuring authenticity and methodological precision. There are often multiple types of participants in a given project. The participants may vary among phases. Typical participants may include learners, designers, instructors and/or program facilitators.

Instructional development is known as developmental research: "the systematic study of designing, developing and evaluating instructional programs, processes and products that must meet the criteria of consistency and effectiveness" (Seels & Richey, 1994, p. 127).

There are three perspectives to investigate this phenomenon: the qualitative perspective (e.g. Denzin & Lincoln, 2005) which includes observation, interview, and in-depth investigations, the quantitative perspective (e.g. Shadish, Cook, & Campbell, 2002) which has the notion of measurement that transcends subjectivity, and the mixed methods perspective (e.g. Teddlie & Tashakkori, 2009) which attempts to integrate both qualitative and quantitative perspectives. However, the education research community, in order to better describe actual research processes, have combined techniques in ways that are not specified by the quantitative, qualitative, and mixed methods approaches (Gorard & Symonds, 2010). Teddlie and Tashakkori (2009) noticed the trend of applying the mixed methods for data triangulation.

Jogulu and Pansiri (2011) in their analysis of PhD theses which employed a mixed methods approach highlighted two strategies being used: concurrent and sequential. In the concurrent strategy, different research methods are incorporated into the same research study and the resultant data are integrated to interpret the results. In the sequential strategy, one method is applied initially, followed by another method, and possibly followed by a third. The findings of one method help shape the subsequent method which makes this strategy appropriate for developmental research.

The use of mixed methods in developmental research involves the collection and analysis of more than one type of data within a research design which is structured in phases. The procedural type of developmental research comprises the following phases: analysis, design, development and evaluation. The modelling type comprises the following phases: model construction, model implementation and model validation.

DEVELOPMENT OF A SELF-REGULATED VOCABULARY LEARNING STRATEGY INSTRUCTIONAL MODULE FOR CHINESE EFL LEARNERS

Ma (2012) investigated how the notions of Self-Regulated Learning (SRL) could contribute to the development of a Self-Regulated Vocabulary Learning Strategy (SRVLS) instructional module. She claimed that SRL has the potential to enhance students' use of self-regulated strategies, motivation and performance in language learning. Hence, she incorporated SRL in her design of a vocabulary learning module for Chinese EFL learners.

She had eleven research questions in her study. This paper presents an analysis of the methodology employed for each research question. Her study comprised three phases. Phase one involved assessing the learners' state of vocabulary knowledge, self-regulatory strategies and perception of vocabulary learning before the instructional module was introduced to them. Phase two was devoted to designing the instructional module. Phase three was the implementation and evaluation of the instructional module.

DATA COLLECTION AND ANALYSIS IN PHASE ONE

To assess the level of passive vocabulary knowledge of 38 pre-university Chinese EFL learners at a university, a vocabulary size test was administered. The vocabulary size levels were set at 2000, 3000, 4000, 5000, and 10000 words. About three quarters of the sample learners were found to be at the 2000 word vocabulary size level.

To assess the frequency of use of cognitive (vocabulary) strategies and metacognitive (control) strategies, a quantitative survey was conducted on a sample of 14 pre-university Chinese EFL learners. The sample learners reported using cognitive strategies more frequently than metacognitive strategies.

The metacognitive strategies were further explored qualitatively by asking students how they did their goal-setting and planning, self-monitoring and self-evaluation in their learning of English vocabulary. Structured questions were employed to elicit in-depth responses which were analyzed according to themes ranging from goal-setting and planning strategies to self-monitoring and self-evaluation strategies.

To assess the perceptions of vocabulary learning, the same set of learners were interviewed. The learners were asked questions regarding difficulty faced in learning vocabulary, interest and motivation, self-efficacy in vocabulary, and vocabulary learning strategy training. Responses from the structured interview revealed that most of the learners were interested in learning vocabulary but as they were not good at learning vocabulary, they needed to be trained in strategies for vocabulary learning.

Within Phase One itself, both quantitative and qualitative data collection methods were employed to analyze the target learners' needs in order to design an appropriate instructional material for vocabulary learning. The design and development phase for this vocabulary learning instructional module constituted the second phase of Ma's project which is examined in the following section.

DATA COLLECTION AND ANALYSIS IN PHASE TWO

Phase Two involves the determination of characteristics of the self-regulated vocabulary learning module. Informed opinions on the module were obtained by asking seven subject matter experts to write their comments

on the following areas: rationale of the module content; learning content of the module; the instructional strategies; and the assessment section of the module.

In addition, the experts had to comment on the various components of the module that promote self-regulatory strategies in vocabulary learning. An in-depth interview was conducted to obtain comments regarding the consistency of the self-regulatory strategies in relation to the aim and objectives of the vocabulary learning module.

Expertise was sought in the above manner to ensure that the content of the module is consistent with theoretical principles. This also ensures that the components in the module were consistently linked to each other. Thus, Prototype One of the learning module was designed.

The practicality of Prototype One was evaluated by three teachers and three students. The teachers were interviewed to obtain their feedback regarding the following aspects of the learning module: appropriateness and accuracy of the language used; instruction for the learning activities; relevance and appeal of the learning activities; layout of the student's book; layout of the teacher's guide; allocation of time for each activity; thematic grouping; and supplementary learning resources.

The students, however, were asked for their responses towards the layout and activities of the module. The responses were categorically grouped as follows: clarity of direction; clarity of instruction; appropriateness of the language used; usefulness and appeal of the learning activities; and readability of the texts.

The findings from the teachers and students were then used to enhance Prototype One to become Prototype Two. It can be concluded that Phase Two was qualitative with the liberal use of interviews.

DATA COLLECTION AND ANALYSIS IN PHASE THREE

Phase Three has two purposes: to determine practicality and to measure effectiveness of Prototype Two which was later renamed as Vocabulary Learning Set (VLS). The VLS comprises 14 levels.

A pre-test on the 14 vocabulary levels was administered to ten Chinese EFL learners at the same university. Besides, the learners were asked to indicate on a given checklist their frequency of use for each of the 12 strategies listed. They were also required to state the efficacy of the strategies they used.

While using the VLS, the students were asked to keep a log on their learning activities. The researcher used structured interview and observation for triangulation. Most importantly, the structured interview focused on the learners' responses to the strategies used in learning English vocabulary. The interview was conducted to gauge the practicality of VLS through the articulation of problems and feedback towards the learning activities.

It can be concluded that the practicality of VLS was determined through the analysis of qualitative and quantitative data while the effectiveness of VLS was based on interpretation of quantitative data. A summary of the methods used in the three phases is presented in Table 1.

Table 1: Methods used in the Phases of a Developmental Research Project

Phase	Methods	Justification of methods used
One (Strategies used, Vocabulary level)	Survey of vocabulary and strategies Questionnaire Structured interview	Data Validation
Two (Characteristics of VLS)	Non-structured Interview	In-depth Data Collection
Three (Content validity, Construct validity)	Activities Log Structured Interview Observation Pre-Post Tests	Data Triangulation

The scores from the survey in Phase One were meaningful indicators of the metacognitive and cognitive strategies that were used by the sample participants. This data provided information on what strategies were lacking among the participants and justification towards developing the VLS set. The questionnaire contained some open-ended questions which elicited the participants' authentic responses in learning English vocabulary. Interviews were conducted to confirm the information obtained from the questionnaire. Thus, the purpose in using mixed methods in Phase One is to validate the data.

Data validation is also known as member checking. Member checking is a process that involves taking the findings back to the participants through writing or in an interview about the accuracy of the report (Creswell, 2012). In this study, the participants were asked to reflect on their individual situation in vocabulary learning as they understand it, and comment on their answers to the survey.

Phase Two utilised only one method for data collection but the data came from two sources. Different data sources may generate discrepant accounts. These discrepant accounts had informed the researcher to further interpret the prototyping activities.

Phase Three had four methods. The four methods were employed for data triangulation. No single method can give a comprehensive account of the phenomenon under investigation. Thus two or more methods are employed to give a fuller and more informative picture to the phenomenon (Mathison, 1988; Patton, 1980).

The validity of both content and construct of the VLS seem to reside in the judgement of the researcher. Expert knowledge on designing VLS was sought after Prototype One. However, expertise was not evident after VLS was fully developed. Feedback on VLS was solely dependent on students who used the module. This is not consistent with the expectation of objectivity in developmental research (Richey & Klein, 2005).

DETERMINATION OF DATA COLLECTION METHODS BASED ON RESEARCH QUESTIONS

Different researchers may use different criteria to classify research types. Most often, the type of research refers to how the information is sought: quantitative or qualitative. Quantitative research is the numerical representation and manipulation of observations for the purpose of describing and explaining the phenomena that those observations reflect. Cohen (1980) defined quantitative research as social research that employs empirical methods and empirical statements. He states that an empirical statement is a descriptive statement about what "is" the case in the "real world" rather than what "ought" to be the case. Numerical data, such as data collected from a questionnaire survey, are analyzed using statistical methods (Creswell, 1994). Contrastingly, non-numerical data such as information obtained from interviews, are analyzed using thematic categorization.

Besides, there is a difference between the two research processes. The quantitative research process is deductive. The variables are determined before the study. The generalizations lead to prediction, explanation, and understanding. The results are assumed to be accurate and reliable based on validity and reliability tests conducted. However, the qualitative research process is an inductive one. There is a peer examination of the research

process to verify the congruency of the emerging findings with the raw data and tentative interpretations (Merriam, 2009). Emergent themes are shaped as the context-bound categories are identified, thus giving rise to patterns and theories.

Researchers often employ different methods depending on what is appropriate for their research questions. Some researchers use a mixed method approach combining quantitative and qualitative methods. Mixed method research is a flexible approach where the research design is determined by what the researcher wants to find out rather than by any predetermined epistemological position. In mixed method research, either the qualitative or quantitative components can predominate or both can have equal status.

Table 2 shows the eleven research questions of this study. The choice of data collection methods employed to obtain answers to the research questions have to match the areas of inquiry.

Table 2: Determination of Data Collection Methods Based on Research Questions

No.	Research Questions	Type of Data Collection Methods
1	What is the students' current level of passive vocabulary knowledge?	Quantitative
2	What are the vocabulary learning strategies used by the students?	Quantitative & Qualitative
3	What are the metacognitive control strategies used by the students in learning vocabulary?	Quantitative & Qualitative
4	What are the students' perceptions of vocabulary learning?	Qualitative
5	What module content most effectively promotes learners' self-regulatory strategies in vocabulary learning?	Qualitative
6	Are the components of the module for promoting self-regulatory strategies in vocabulary learning consistently related to each other?	Qualitative
7	What are the teachers' opinions on the practicality of the layout and activities of the module?	Qualitative
8	What are the responses of the learners to the layout and activities of the module?	Qualitative
9	What are the learners' responses and what are the problems they encountered during the module implementation in the context of the study?	Qualitative

Cont..

| 10 | What are the responses of the participants to the learning activities used in the SRVLS instructional module in the context of the study? | Qualitative |
| 11 | What is the initial impact of the module on the students' learning in terms of strategy use, motivational beliefs and passive vocabulary knowledge? | Quantitative |

Both questions 1 and 11 required descriptive statistics. Question 1 required quantification of the current level of passive vocabulary knowledge while question 11 required numbers to quantify strategy use, motivational beliefs and passive vocabulary knowledge. Questions 2 and 3 required a mixed method. The qualitative method was used to determine the metacognitive and cognitive strategies followed by the quantitative method to estimate the number of students for each of the strategies. Pre-post tests comprising questions with Likert rating scales were used in research questions 2 and 3. These tests allow for statistical comparison before and after the intervention of VLS.

The remaining research questions revolve around the concept of how the notions of SRL could contribute to the development of Self-Regulated Vocabulary Learning Strategy (SRVLS) instructional module. The purpose statement in Ma's study has two components to it: the characteristics of the SRVLS instructional module that has the potential to enable pre-university Chinese EFL learners to acquire self-regulatory strategies; and instructional design elements to improve their strategy use, motivation and achievement for vocabulary learning.

The seven qualitative questions as shown in Table 2 are open-ended and general. The answers to each have to be segmented as a unit of data that form part of an answer to the question(s) (Merriam, 2009). According to Lincoln and Guba (1985) a unit of data must meet two criteria. Firstly, it should be heuristic: the unit should reveal information relevant to the study. Secondly, the unit should be the smallest piece of information which is singularly meaningful. These units are then assigned into distinctive categories. The names of the categories and the scheme used to sort the data reflect the focus of the study.

Using an example in response to the third question in Table 2, "I try to remember 20- 30 words per day" was interpreted as "no goal setting and planning". There were ten similar quotes for this category among the 38 respondents. Each quote is a unit of data. In Ma's study, categories are

similar quotes aggregated together. Moreover, the names of the categories came from Ma as a researcher and were informed by the literature on metacognitive strategies. Figure 1 illustrates Ma's approach in reporting her results.
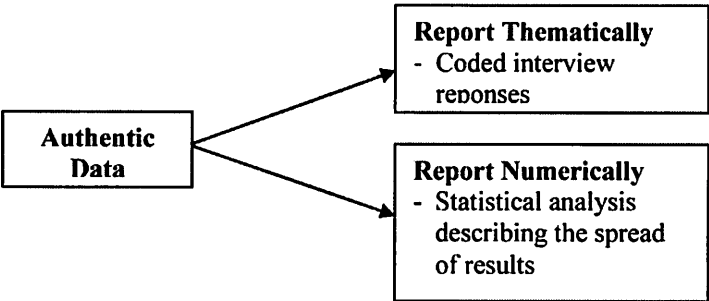

Figure 1: Ma's Approach to Reporting Result

CONCLUSION

In Ma's study, she has planned the design to answer eleven research questions with a variety of methods. This analysis of Ma's study has shown how two or more methods can be employed to give a fuller and more informative picture to the phenomenon of developing a self-regulated vocabulary learning strategy instructional module for Chinese EFL learners. No single method can give a comprehensive account of the phenomenon under investigation. Quantitative methods are used when the researcher is looking for breadth of the phenomenon under investigation. Qualitative methods are used for depth and meaning to the phenomenon under investigation. A pragmatic approach would be to employ both quantitative and qualitative methods. Ma's study reports the development of an instructional module which makes it a developmental research project employing a mixed methods approach.

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