

USING TRIANGULATION TO ENHANCE THE QUALITY OF A QUALITATIVE RESEARCH INVESTIGATING THE ORAL INSTRUCTIONAL LANGUAGE OF TEACHER TRAINEES IN TEACHING SCIENCE IN ENGLISH

*Azian Abd Aziz @ Ahmad, Associate Professor Dr. Abdul Halim Abdul Raof
Department of Modern Languages
Faculty of Management and Human Resource Development
Universiti Teknologi Malaysia*

Abstract

Qualitative research has for decades been prolifically used in the social sciences. It continues to thrive and has made numerous profound contributions in providing insights into the social world. Nevertheless, despite such an achievement, qualitative research has often been labelled as unscientific due to its subjective and interpretive nature. Such a negative perception is more often than not caused by some methodological factors which have distorted the results in one way or another. Thus, what is needed is to use some form of standards or guidelines which could help enhance the trustworthiness of a qualitative research as well as minimise any threats to its validity. One such guideline is the use of triangulation. Four basic types of triangulation (i.e. theoretical, data, method and investigator triangulation) are described in this paper in the context of investigating the oral instructional language of teacher trainees in teaching science in English.

1.0 Introduction

Dornyei (2007) and Richards (2003) list the following as typical characteristics of qualitative research. Firstly, it takes place in a natural setting, devoid of any manipulation. It is also concerned with gaining insights into the lived experiences of the participants and usually focuses on a small number of participants. In addition, it utilises an emergent research design which is flexible in nature and can evolve in tandem with the development of the study. Hence, it generates rather than tests hypotheses. Finally, it is fundamentally interpretive as the data obtained would be subjectively interpreted by the researcher.

It is these characteristics that have allowed qualitative research to present a broader point of view through the inclusion of unexpected findings as well as obtain more comprehensive findings through the use of context (Ammenwerth et. al, 2003). Nevertheless, despite the ability of qualitative research to provide invaluable insights into human behaviour, it still has its critics. However, as pointed out by Decrop (1999), the main criticism against qualitative research is not on the usefulness of qualitative data, but rather, on the criteria by which the trustworthiness of qualitative research is based. One way in which to counter such criticisms and to strengthen the design of a qualitative study, is through triangulation.

1.1 Triangulation

Denzin (1978) and Patton (1990) identify four basic types of triangulation that contribute to enhancing the validity of qualitative analysis:

1. Theoretical triangulation – using multiple theoretical perspectives in interpreting a set of data
2. Data triangulation – using data from different sources in investigating a particular phenomena
3. Method triangulation – using more than one method of data collection, which could either be ‘within-method triangulation’ such as using two different types of questionnaire, or ‘between-method triangulation’ such as using observation and interviews to assess a particular issue.
4. Investigator or analyst triangulation – using more than one researcher either in collecting or analysing data.

Triangulation allows research findings to be checked against other data and perspectives. This would ultimately reduce any bias in the data. In view of the benefits offered through the use of triangulation, this research, in investigating the oral instructional language of teacher trainees in teaching science in English has strived to incorporate all four types of triangulation. The following paragraphs will illustrate how the four types of triangulation have been incorporated into a qualitative study investigating the oral instructional language of non-native speaker (NNS) teacher trainees in teaching science in English.

1.2 Background of the Study

The Malaysian government, in 2002 announced that commencing 2003, English would be used as the medium of instruction in the teaching and learning of mathematics and science subjects. Studies on needs assessments of practising mathematics and science teachers teaching in English, reveal that practising teachers tend to rate oral instructional English language ability as the most crucial in implementing the teaching and learning of science and mathematics in English (Noraini Idris et al., 2007; Kamisah Osman, et al., 2006). However, a significant percentage of mathematics and science teachers surveyed indicated their reservations of their English language spoken ability in the classroom (Hamidah Ab Rahman et al., 2005) with a high percentage admitting to needing help in spoken English (Noraini Idris et. al., 2007; Kamisah Osman, et al., 2006). To boost the confidence and morale of these teachers, the Ministry of Education, Malaysia launched a large scale and concerted support mechanism to help develop practising mathematics and science teachers’ English language competence via the English for the Teaching of Mathematics and Science (ETeMS) in-service training programme. The programme provides opportunities to develop language in three broad areas: i) for accessing information, ii) for teaching mathematics and science, and iii) for professional exchange (ETeMS Module, 2003).

With so much emphasis given to practising teachers, another equally important group of teachers, namely those training to be mathematics and science teachers, have largely been ignored. This group of teachers are not receiving any formalised English language training as enjoyed by their practising counterparts, nor have their English language needs been analysed. Instead, it has been largely up to the respective teacher education institutions which train these teachers to decide and implement any English language training as the institutions deem fit.

The current trend employed by teacher education institutions is to focus on three main elements, namely, knowledge of content subject, pedagogical courses and practice and lastly general education courses (Committee on Science and Mathematics Teacher Education, 2000; Faculty of Education UTM Academic Guidelines, 2006/07). However, as argued by Ozgun-Koca and Sen (2006), being good at doing

mathematics or science does not equate to being good at teaching them. This is because thought processes do not work in isolation as language is needed to reformulate the process (Vygotsky, 1978). Thus, ignoring the English language needs of mathematics and science teacher trainees could prove to be detrimental to the teaching and learning of science in English because appropriate language is needed to impart knowledge.

Thus, the purpose of this study is to determine the language demands faced by non-native speaker (NNS) science teacher trainees in the second language (L2) science classrooms. In order to achieve this purpose, it intends to answer the following research questions:

1. What are the characteristics of the oral input that learners receive from their NNS science teacher trainees in the L2 science classroom?
2. Which oral instructional language techniques employed by the NNS science teacher trainees in the L2 science classroom are perceived by the learners to act as comprehensible input?
3. Which oral instructional language techniques employed by the NNS science teacher trainees in the L2 science classroom provide support or scaffolding to the learners?

2.0 Design of Study

In the study's efforts to obtain insights into the L2 science classroom, data will be collected as they occur in their natural setting, which in this case, is the L2 science classroom. This study is thus concerned with conducting an empirical observation in an authentic situation. Neuendorf (2002 : 14) defines empirical observation as "...based on real, apprehendable phenomena." As language needs to be observed and understood in a natural setting, the qualitative research design therefore offers the best source of illumination (Rossman and Ralis cited in Creswell 2003).

The following paragraphs will describe the design of the study highlighting the triangulation aspect.

2.1 Theoretical triangulation

The study has been framed against three theoretical perspectives, namely, communicative competence theory, second language acquisition (SLA) theories and sociocultural theory. Communicative competence theory is very much relevant to this study as a speaker needs to know what to say, how to say it and when to say it. At first glance, communicative competence can be perceived to be intrapersonal in nature. However, as noted by Savignon (1983 : 8), "...communicative competence is relative, not absolute, and depends on the cooperation of all the participants involved." In other words, it is a dynamic interpersonal construct which is manifested during an interaction (Brown, 2000). However, of the four communicative competence components, grammatical, sociolinguistics, discourse and strategic competence (Canale, 1983; Canale and Swain, 1980), only discourse and strategic competence will be addressed in the study. This stand is taken in view of the English as an International Language context. Thus, taking the communicative competence framework in total would be, "...utopian, unrealistic and constraining...". (Alptekin, 2002 : 59).

In turning to second language acquisition (SLA) theories and research, Krashen's (1982, 1985) Input Hypothesis offers a plausible explanation of the role of teachers' oral instructional language in the content classroom. The Input Hypothesis argues that for learners to progress, they need to be provided with comprehensible input which is slightly beyond the L2 learner's current competence level ($i + 1$). It is further suggested that language simplification together with contextual and extralinguistic cues can help promote comprehensible input. Krashen's (1982, 1985) Input Hypothesis is not without its detractors. For instance, although Long (1985, 1996) acknowledges that simplified input and context promote comprehensible input, he argues that interactive input is more important than non-interactive input in facilitating comprehension. This is because interactional adjustments made would allow the learner or less proficient interlocutor to make the connection between input, selective attention and output. Long's (1985, 1996) Interaction Hypothesis thus postulates that it is interactional modifications such as comprehension checks, clarification requests and paraphrase, which occur in meaning negotiation, are crucial in making the input comprehensible.

Finally, the sociocultural approach asserts that knowledge is acquired first on the social level between people as an interpsychological category and later, on the individual level inside the individual as an intrapsychological category (Vygotsky, 1978). According to the Vygotskian perspective, the teacher or some other knowledgeable person plays a key role in mediating and facilitating learners' knowledge acquisition. He uses the 'zone of proximal development' (ZPD) to conceptualise the developmental potential of a learner where he defined the ZPD as "...the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance..." (Vygotsky, 1978 : 86).

As argued by Denzin (1989) examining the same data against several theoretical perspectives not only offers a more reliable form of criticism, but also conforms to the scientific method.

2.2 Data triangulation

Data triangulation in the study involves obtaining data from two different sources. The first source of data would be obtained from science teacher trainees selected using the purposive sampling method. The second source of data would be collected from learners or pupils attending the L2 science classrooms, selected using the disproportional stratified random sampling method.

In order to make informed decisions pertaining to the oral instructional language needs of science teacher trainees in the L2 science classrooms, the target speech community itself would be investigated. This would involve obtaining data directly from the science teacher trainees themselves. Data would be collected via classroom observation. This would entail a transcription of the science teacher trainees' oral instructional language produced in the L2 science classroom, as well as the context in which the language is produced. The science teacher trainees would also be interviewed using the stimulated recall technique.

Feedback from learners or pupils in the L2 science classroom would also be obtained. As Good and Brophy (1994) point out, learners are not passive recipients in a classroom as they need to construct their own meaning and must make an effort to understand the information that has been imparted to them in order for the imparted knowledge to become useful and meaningful. Allwright (2005:16) corroborated with this view when he argues that, "...teachers and learners co-

construct their lessons...in this sense, lessons were jointly managed rather than managed by teacher in full control of everything.” In other words, if the learners were to be left out, there would be a misrepresentation between the relationship of teaching and learning as it would imply that what is important in a classroom is what gets ‘taught’ rather than what gets ‘learned’.

Obtaining data from two different sources could enhance the understanding of the phenomenon under investigation.

2.3 Method triangulation

Method triangulation in the study involves the use of ‘between- method triangulation’ where two different methods of data collection have been applied to access information from the same group of participants, namely the science teacher trainees.

All oral instructional language produced by the science teacher trainees in the L2 science classroom would be audiotaped and transcribed. The data would then be analysed by the researcher which entails coding and categorising before moving towards interpretation (Miles and Huberman, 1994; Coffey and Atkinson, 1996). This is in fact a typical way in which verbal data is analysed, with researchers providing their own interpretation pertaining to what is going on and as to the value of the exchange (see for example Viiri and Saari, 2006; Nassaji and Wells, 2000). However, Hawkins (1985), in using a posttask commentary technique to elicit comments from her respondents, found that respondents were seen to produce correct responses during an interaction, despite not understanding what was being said in the communication. Evidence from Hawkins’s (1985) study suggests that interpretations of verbal language, need to proceed with caution.

In view of the shortcomings of merely relying on the researcher to interpret the verbal data produced by the science teacher trainees, it would be prudent to use another method which could compensate for such a weakness. Thus, the science teacher trainees would also be interviewed using the stimulated recall method. This would involve the researcher and participant (individual science teacher trainee) listening to one complete audiotaped lesson. As they listen to the audio recording, either the researcher or participant, would be free to stop the tape and comment on specific oral features. The participant would be required to articulate what he or she was thinking at the particular time when he or she was talking in class.

Examining the same thing from two different perspectives could provide a more authentic portrayal of the issue being investigated.

3.0 Investigator or Analyst Triangulation

Having several researchers investigating the same issue could help reduce potential bias which could occur as a result of having only one researcher (Patton, 1990). However, this involves considerable concerted team effort. In a situation such as a PhD research, which involves only one researcher, it would be rather difficult to have multiple investigators, unless it is something which is already built in, such as a research evaluating the teaching practice of science teacher trainees. Here, it would be possible for the science teacher trainees or participants to be evaluated not only by the researcher, but also by their practicum supervisors appointed by the respective educational institutions.

Nevertheless, in the event of it not being practical to have multiple investigators, a possible alternative would be to have more than one analyst independently examining the same data. Any comments, additional information and disagreements could then be taken into account. Having more than one analyst could help enhance the credibility of the analysis.

4.0 Conclusion

This triangulation of gathering data, which uses a variety of methods, sources and perspectives, tends to balance out the strengths and weaknesses of each method (Neuendorf, 2002). In addition, it provides the framework for a thick description (Geertz, 1973) which gives significance to what is being observed. As Denzin (1994 : 505) points out, "A thick description ... gives the context of an experience, states the intentions and meanings that organised the experience and reveals the experience as a process." Thus, the complex facets of science teacher trainees' talk in the L2 science classroom could be better revealed through the varied research instrument used. In short, triangulation allows comparison of multiple perceptions of the same phenomena which contributes to the trustworthiness of the data (Glesne, 2006) and increases the validity of the qualitative research (Stake, 1994).

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