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Enhancing the Quality of the Findings of a Longitudinal Case Study: Reviewing Trustworthiness via ATLAS.ti

Chooi Kean Ang
Institute of Teacher Education International Languages Campus Malaysia, ackean05@gmail.com

Mohamed Amin Embi
National University of Malaysia, m.amin@ukm.my

Melor Md Yunus
National University of Malaysia, melor14@yahoo.co.uk

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Abstract

Case study often implies the collection of unstructured data and qualitative analysis of those data. Additionally, it is often argued that the aim of case study research should be to capture cases in their uniqueness, rather than to use them as a basis for wider generalization or theoretical inference of some kind. Hence, it often raises a fundamental issue about the aspect of trustworthiness. This paper aims to examine the extent of support by using ATLAS.ti for data analysis in establishing trustworthiness in a longitudinal case study. The case study is on the use of e-portfolio as a continuing professional development tool for six Japanese language non-native teachers in the secondary schools in Malaysia. This study adopts the interpretivist perspective and uses three main strategies: triangulation (data and methodological triangulation), member checking and audit trail to establish trustworthiness. The use of ATLAS.ti does indeed help to substantiate the analysis and interpretation of the data. Additionally, by using the software programme, it facilitated the three strategies, specifically in capturing triangulation and audit trail of the longitudinal study with its features of merging code and memo, and member checking with its thematic network viewing or an alternative textual report features. Particularly, the researchers advocate the use of CAQDAS in a longitudinal study as it enables the analysis of various data collected under different project files; called "Hermeneutic Units" at the different phases throughout the period of study and subsequently by merging them together at the end of the study, it allows the richness of the analysed data and thus, enhances the quality of the qualitative inquiry in this study.

Keywords

Qualitative Data Analysis, ATLAS.ti, Trustworthiness, Longitudinal Case Study

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Chooi Kean Ang
Institute of Teacher Education International Languages Campus Malaysia
Kuala Lumpur, Malaysia

Mohamed Amin Embi and Melor Md Yunus
National University of Malaysia, Selangor, Malaysia

Case study often implies the collection of unstructured data and qualitative analysis of those data. Additionally, it is often argued that the aim of case study research should be to capture cases in their uniqueness, rather than to use them as a basis for wider generalization or theoretical inference of some kind. Hence, it often raises a fundamental issue about the aspect of trustworthiness. This paper aims to examine the extent of support by using ATLAS.ti for data analysis in establishing trustworthiness in a longitudinal case study. The case study is on the use of e-portfolio as a continuing professional development tool for six Japanese language non-native teachers in the secondary schools in Malaysia. This study adopts the interpretivist perspective and uses three main strategies: triangulation (data and methodological triangulation), member checking and audit trail to establish trustworthiness. The use of ATLAS.ti does indeed help to substantiate the analysis and interpretation of the data. Additionally, by using the software programme, it facilitated the three strategies, specifically in capturing triangulation and audit trail of the longitudinal study with its features of merging code and memo, and member checking with its thematic network viewing or an alternative textual report features. Particularly, the researchers advocate the use of CAQDAS in a longitudinal study as it enables the analysis of various data collected under different project files; called "Hermeneutic Units" at the different phases throughout the period of study and subsequently by merging them together at the end of the study, it allows the richness of the analysed data and thus, enhances the quality of the qualitative inquiry in this study. Keywords: Qualitative Data Analysis, ATLAS.ti, Trustworthiness, Longitudinal Case Study

Establishing trustworthiness, in regard to the concepts of validity and reliability is a crucial concern in ensuring the quality of a qualitative research. However, unlike a quantitative research, Firestone (1987) stated that qualitative study provides the reader with a depiction in enough detail to show that the author's conclusion "makes sense" (p. 19; as cited in Merriam, 1998). This is also echoed by Bailey (2007), "trustworthiness does not mean that the reader necessarily has to agree with the researcher; rather it requires the reader to see how the researcher arrived at the conclusion he or she made" (p. 181). Thus, Bailey (2007) further emphasized that the researcher interested in establishing trustworthiness should take care to provide a detailed methods section in their research write-ups. This paper therefore aims to provide a review on the quality in establishing trustworthiness in the stipulated research project study on continuing professional development (CPD) for Malaysian Japanese language teachers using e-portfolio. Specifically, the role of Computer Aided Qualitative

Data Analysis Software (CAQDAS) in facilitating the complexity of data analysis process and establishing trustworthiness in the qualitative research study is examined in this paper.

The Research Study and Issue of Trustworthiness

The research study is an initiative of utilizing e-portfolio development as a mechanism of self-directed professional development among non-native speaking teachers of Japanese language. The two-tiered development of e-portfolios (individual and group-based) would signify the potential use of e-portfolio in the formation of a community of practice and the promotion of collaboration and networking among the teachers.

Due to its descriptive and interpretive nature, this study employs a qualitative case study methodology. It adopts a longitudinal design which involves collection of data over time and at four specific points in time throughout the study period. Data collection comprises three email interviews at the first three phases of the study, a face-to-face interview at the middle point of the study and an online questionnaire at the end of the study period. For the purpose of collecting the data, this study entails a collective case study. On the other hand, case study often implies the collection of unstructured data and qualitative analysis of those data. Hence, it often raises a fundamental issue about the aspect of trustworthiness. For instance, it is argued that the aim of case study research should be to "capture cases in their uniqueness, rather than to use them as a basis for wider generalization or theoretical inference of some kind" (Hammersley & Gomm, 2000, p. 3). Additionally, Patton (1990) voiced his criticism about qualitative research for being too subjective in his statement as follows: "…has such negative connotations in the public mind that to openly advocate the value of subjective insight in evaluation research is to risk undermining the credibility of one's work" (p. 55).

Furthermore, Sandelowski (1997, cited in Johnson & Waterfield, 2004) claimed that there was still a sense of distrust of qualitative research due to its perceived inability to produce useful and valid findings beyond a supplementary role to quantitative research. Keeping these points in mind, the researchers took the initiative to ensure the achievement of rigour in the study so that the qualitative case study method employed in this study is more than just subjective views of events.

In a nutshell, this paper therefore sets out to consider how rigour or thoroughness in qualitative research study can be better addressed using CAQDAS, namely ATLAS.ti in this study. The researchers agree with Lincoln and Guba's (1985) perspective that addressing rigour in qualitative research amounts to being able to assess the trustworthiness of the processes and procedures of the research and hence adopt their trustworthiness framework in this study. This framework which encompasses four criteria is discussed in the following section.

Establishing Trustworthiness

Basically, there are two major types of research paradigms: positivitism and interpretivism (also being referred to as postpositivism and constructivism) to a qualitative inquiry. This study situates itself in the interpretivist paradigm due to the exploratory nature and qualitative inquiry of the research project. Moreover, this research project is related to the field of Information and Communication Technology (ICT), namely the use of e-portfolio. According to Walsham (2006), interpretivism has grown in importance in the field of Information and Communication Technology (ICT) researches in the past decade.

Carcary (2009) noted that the interpretivist research paradigm emphasises qualitative research methods which are "flexible, context sensitive and largely concerned with

understanding complex issues" (p. 11). Hence, it is not surprising that the issues regarding trustworthiness in interpretivist researches were widely debated especially by positivist researchers who often regard qualitative research methods as unscientific (Byrne & Ragin, 2009; Carcary, 2009; Gilroy, 2006). In contrast, positivist research paradigm emphasises the issues of validity, reliability and generalisability. Consequently, interpretivist researchers suggested new criteria for evaluating qualitative inquiry. Various terminologies were being coined and many different approaches were being discussed as alternatives to evaluating qualitative researches in the literature. (Creswell & Miller, 2000; Denzin & Lincoln, 1998; Lewis, 2009; Lincoln & Guba, 1985; Merriam, 1998). A highly influential and popular one was by Lincoln and Guba (1985) who redefined reliability and validity as parallel concepts consisting of four criteria of credibility, transferability, dependability and confirmability and later Guba and Lincoln (1994) expanded into an embedded set of five criteria: credibility, transferability, dependability, confirmability and authenticity.

As stated earlier, this study adopts Lincoln and Guba's (1985) four criteria in establishing trustworthiness. Table 1 displays a list of the four criteria and its respective details.

Table 1: Lincoln and Guba's (1985) Four Criteria in Establishing Trustworthiness

Credibility (in preference to internal validity)	Confidence in the "truth" of findings based on the research design, subjects/informants and context
Transferability (in preference to external validity/generalisability)	Applicability of the findings in other contexts
Dependability (in preference to reliability)	Consistency and replicability of the findings with the same subjects or in a similar context
Confirmability (in preference to objectivity).	Degree of neutrality or the extent to which the findings of a study are shaped by the respondents and not researcher bias, motivation or interests

Note: Improved version from Azza (2013).

Use of the ATLAS.ti in Enhancing Trustworthiness

In the recent years, qualitative researches are enjoying unprecedented popularity, not only because of its richness of collected data; but also, because of the recent advancement in the techniques of data analysis (Rambaree, 2008). With the advent of CAQDAS, qualitative researchers are having new avenues for a more rapid, rigorous and in-depth qualitative data analysis. Past literature have shown that CAQDAS enables meticulous, yet rapid, concise (Azza, 2013; Carcary, 2011; Hwang, 2008) and substantiated data analysis without risking trustworthiness but instead enhancing it (Sinkovics, Penz, & Ghauri, 2008). Specifically, Rambaree (2007) stated that CAQDAS has allowed a more rapid, rigorous and scientific qualitative data analysis. Hwang (2008) states that he believes that for empirical benefit, it will enhance credibility building by making the research processes more transparent and replicable. In addition, Rambaree (2014) verifies that CAQDAS has been very useful in facilitating the task of the researcher(s) to interpret the gathered evidence using different methodological approaches.

There are a variety of other CAQDAS software such as nVivo, N6, HyperResearch, MAXqda, Qualrus, NUD*IST and The Ethnograph (Carcary, 2011; Rambaree, 2007). ATLAS.ti is one of the popular choices. In this study, its recent version 7.5.10 is used to

analyse the data collected throughout the longitudinal four-phase study of a total period of thirty six months (three years). As observed by Azza (2013), the utilization of ATLAS.ti 7 in aiding the process of data analysis is believed to have enormous potential in bringing more rigor and trustworthiness to qualitative inquiry of the case study. Thus, the researchers chose to utilize the software despite the small number of respondents in the study in order to analyse the data collected throughout the study at its different four phases and then to collate as well as triangulate the findings as a whole. Moreover, Hwang (2008) advocates the use of ATLAS.ti for its empirical benefit of enhancing credibility building by making the research processes more transparent and replicable. As a matter of fact, with the small number of respondents, it was possible and easier to develop case study protocol based on individual respondents in this study.

Findings

Review of literature has highlighted a range of strategies and provisions that may be adopted by researchers in addressing the four criteria for trustworthiness (see for example Krefting, 1991; Shenton, 2004). Due to limitation of an article, this paper only discusses only the three main strategies which are taken to establish trustworthiness in this study. They are triangulation, member check and audit trail.

Triangulation

Triangulation is the strategy commonly used to establish three of the four criteria which are *credibility, dependability and confirmability.* Lincoln and Guba (1985) argue that ensuring credibility is one of most important factors in establishing trustworthiness. Specifically Yin (1994, p. 34) asserts that in case study research, "multiple sources of evidences" are used as a tactic to triangulate data to address concerns with construct validity because the multiple sources of evidence essentially provide multiple measures of the same phenomenon.

According to Azza (2013), in order to triangulate data across sources, the researcher needs to develop evidence for an interpretation from several informants, particularly several types of informants based on purposive sampling. In addition, triangulation may involve the use of different methods, especially observation, focus groups and individual interviews, which form the major data collection strategies for much qualitative research (Shenton, 2004). In short, for triangulation, the researcher can employ the use of a diversity of informants, or/and a range of documents as source material. In this study, data from six sources of informants (subject cases) and three email interviews, one face-to-face interview and one online questionnaire throughout the study period were examined.

Creswell and Miller (2000) advise that in establishing trustworthiness, the researcher needs to employ a systematic process of sorting through the data to find common themes or categories by eliminating overlapping areas. By using ATLAS.ti, the researcher was able to carry out the process analysis at the different phases of the longitudinal study and corroborate the data collected through the interviews and online questionnaire from the six sources of informants in identifying major and minor categories or themes. Additionally, ATLAS.ti also facilitates code-recode procedure which is a means to increase the credibility and dependability of the study. Using the panoply of coding functions available in ATLAS.ti 7 such as open or free coding, code in vivo, and code by list, the first layer of data was coded. (Figure 1)

Figure 1: Coding Functions
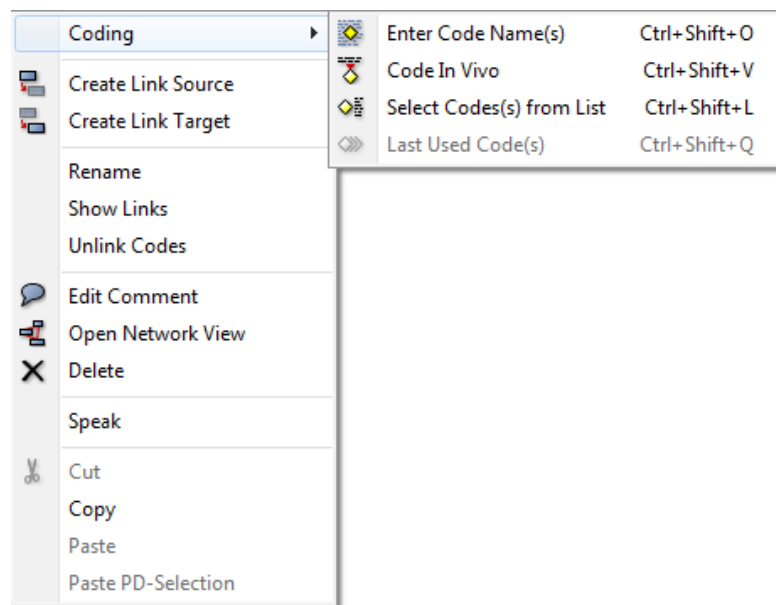
For example, using open or free coding function, the following quotation gathered from a subject case (SC01): "Gives me the opportunity to sit back and reflect on all the activities, achievements I had while trying to create my e-portfolio" was coded in the first layer as "Creating opportunity to reflect" but in the recoding procedure after a lapse of three weeks, it was coded as "Provided opportunity for reflection on past work/achievement." This was in line with Krefting (1991)'s suggestion for the researcher to wait for at least two weeks before recoding it as if for the first time.

This procedure was retrievable using feature of the network view by highlighting on that particular quotation as shown in the Figure 2 below.

**Figure 2**: Code-Recoding Procedure using Network View Feature
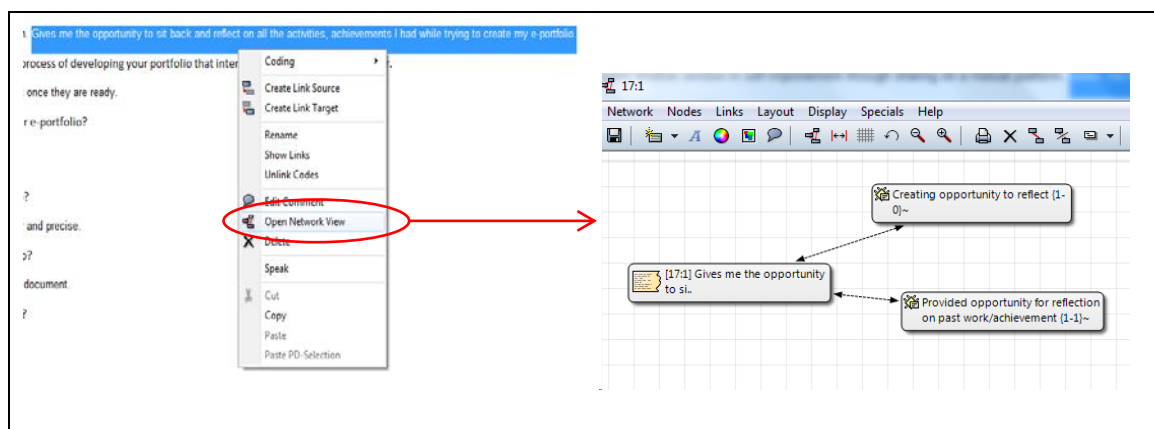
Krefting (1991) notes that the triangulated data sources are assessed against one another to cross-check data and interpretation. In this study, for this particular quotation, it was triangulated with another source of informant (SC01) using and combined with its respective similar code of "Enabling an ongoing process of learning" and recoded under the category of "Benefits/Gains from Experience" at the second layer of data analysis. The processes of the interpretation were labelled in the network view using the comment function

and by enabling "display comment" function, it enables cross-checking of the data and interpretation.

Figure 3 provides an overview of the outcomes of that particular quotation after the code-recode procedure whereas Figure 6 provides the overview of the cross-checking procedure with another source of informants and its categorization of the relevant codes as explained above.

Figure 3: Overview of Code-Recode
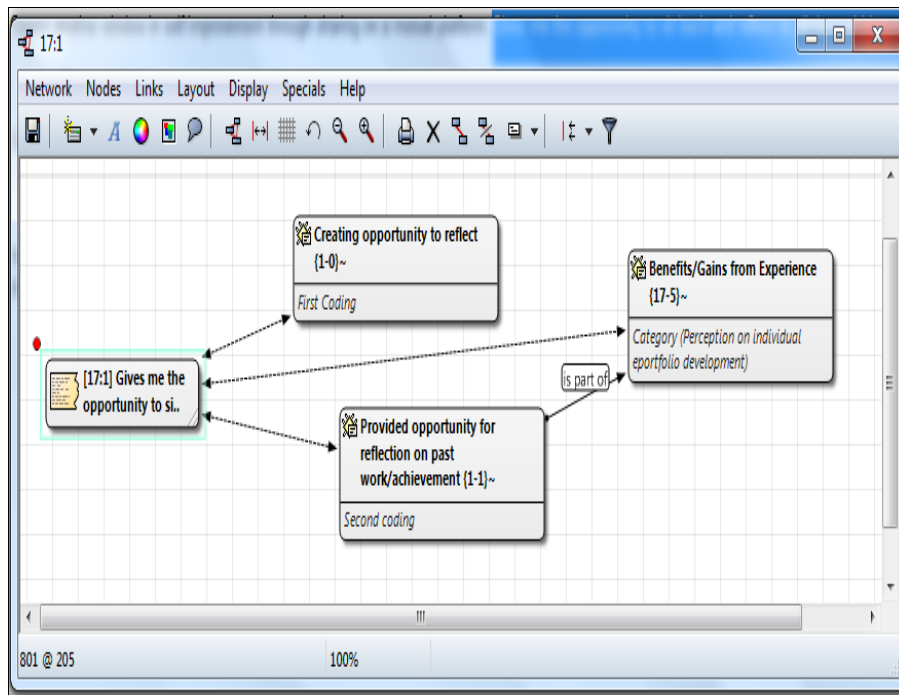
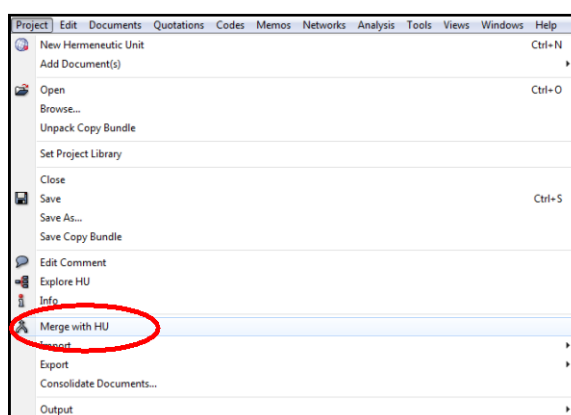**Figure 4:** Overview of the Cross-Checking and Categorization
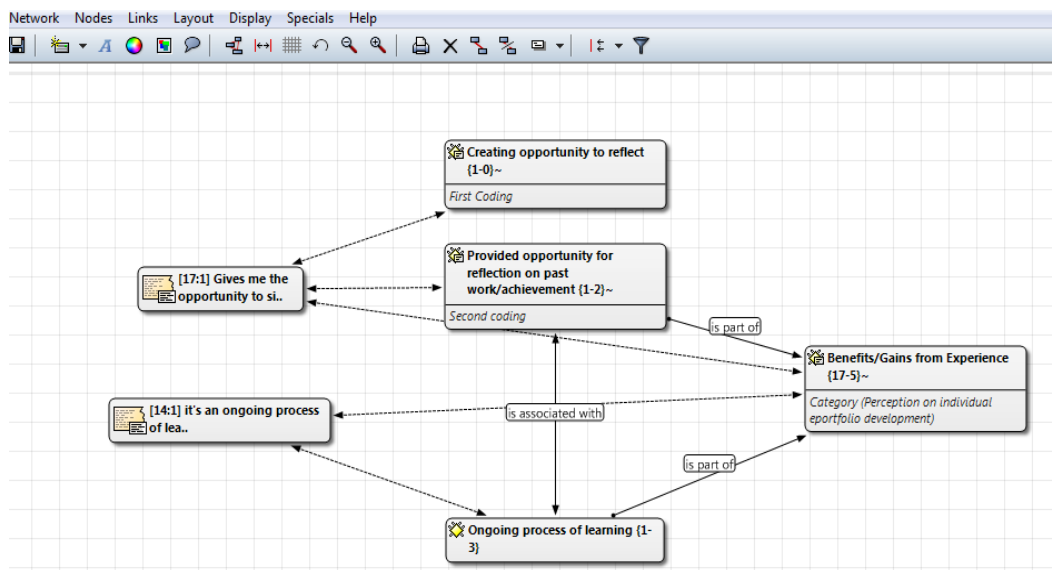
In the case of triangulation of data methods, in this study, the capability of ATLAS.ti through its function of merging HU (as shown in Figure 5) enables the procedure of

triangulation across the data collected from the different methods. In this study, the process of collecting and analysing of data was carried out according to the four phases at the different points of time during the research study. (Refer Figure 1 above). For each phase of the study, a new Hermeneutic Unit (HU) was created for its respective data analysis and saved as a separate file under different label in accordance with the phases and data collection methods. Then, a main file was created after the completion of data analysis of Phase 2 to merge the HUs of Phase 1 and Phase 2 together and subsequently Phase 3 and Phase 4 as well as the added method of face-to-face interview are merged together in the main file while maintaining their original files. This collation of the different methods enables triangulation between the data collected through the coding procedure as explained above. Additionally, the advanced function of merging strategies (as shown in Figure 6) enriches the potentials for triangulation and further investigation of the data.

Figure 5: Merging of HUs Function   **Figure 6**: Merging Strategies Function
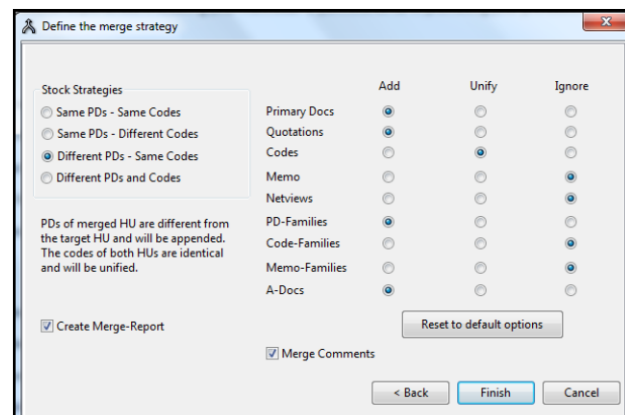

In short, by the using ATLAS.ti, the researchers have managed to carry out triangulation of data sources and methods and succeeded in obtaining a clearer as well as a more complete picture of what is being studied and to cross-check information; and thus enhancing trustworthiness of the research.

Member Check

Creswell (2009) suggests the use of member checking to determine the accuracy of the qualitative findings through taking the final report or specific descriptions or themes back to the research participants and to check the opinion of the participants about the accuracy of the findings. However, it is interesting to note that this does not merely mean taking back the raw transcripts to check for accuracy but the researcher should instead take back parts of the polished product, such as themes, the case analysis, the grounded theory, the cultural description and so forth. Creswell (2009) further suggests that by doing so, this procedure can involve conducting a follow-up interview with participants in the study and providing an opportunity for them to comment on the findings. In this study, first by utilizing the function of assigning families, all related data and interpretation for each of the subject cases were compiled under separate family folders which were labelled in accordance with their respective codes and pseudonym names (Refer Figure 7 below).

Figure 7: Data Compilation of Subject Cases by using the Assign Family Function
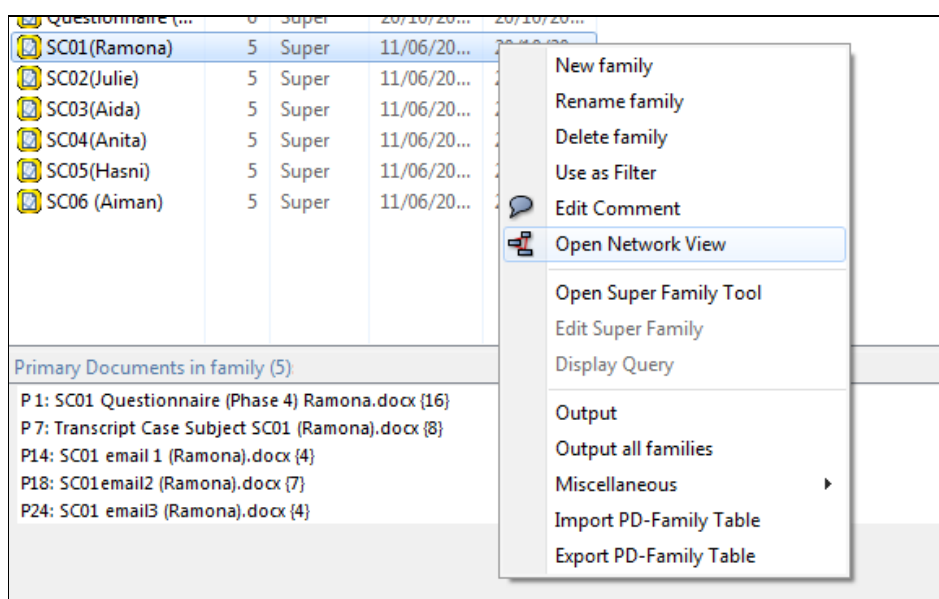

Secondly, by utilizing the functions of Network View and Family Manager, the researchers were able to create network views and then save the files as graphic files for each of the subject cases (Figure 8). Thirdly, through the function of import codes as well as quotations, the researchers managed to obtain a more complete picture of the data and interpretation (Figure 9) which could be shared with the subject cases for them to review the findings and comment on their accuracy.

**Figure 8**: Network view of Data Compilation according to Subject Case
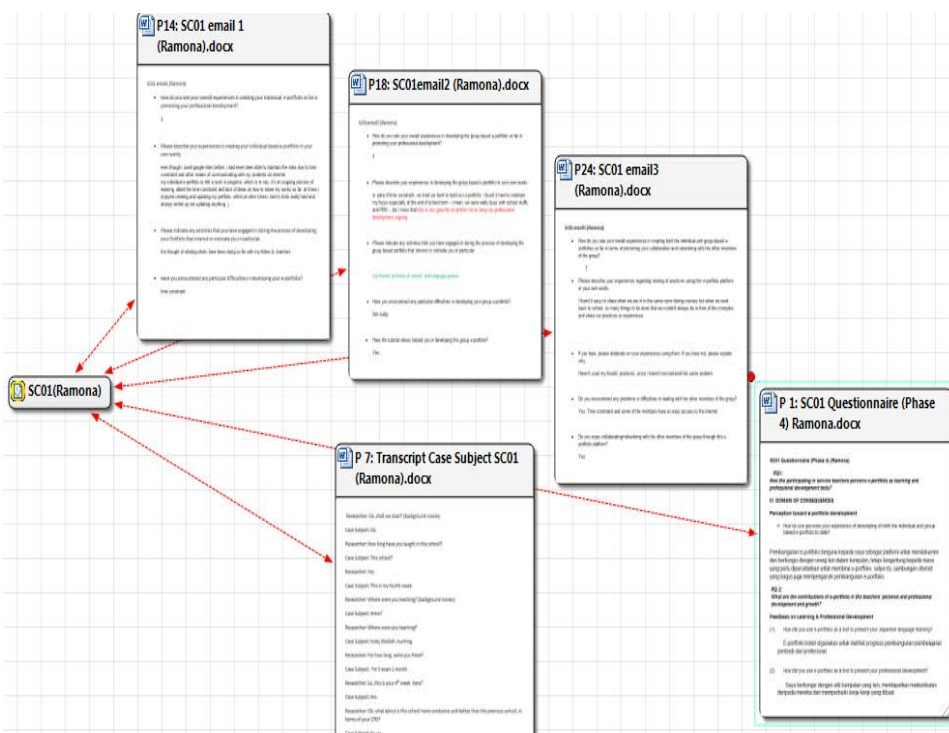
Figure 9: Importing Codes or/and Quotations for a more Complete Data
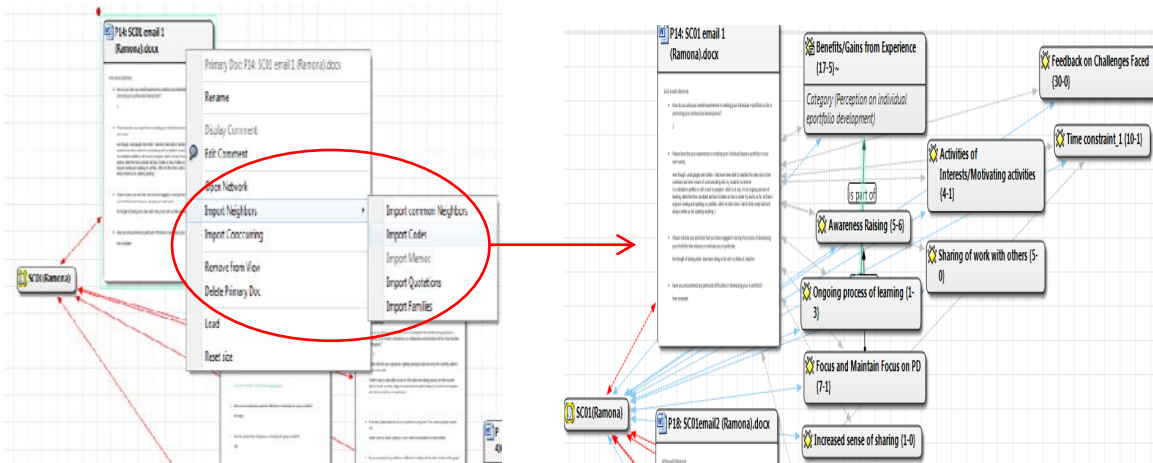
Alternatively, by simply using the function of output under the Family Manager View, instead of network view (Figure 10), a report of textual document can also be easily generated. The document can be saved as soft copy file or be printed out as hard copy document. This format too could be easily shared with the research participants for purpose of member checking.

Figure 10: An Alternative to Graphic File by Using Output Function
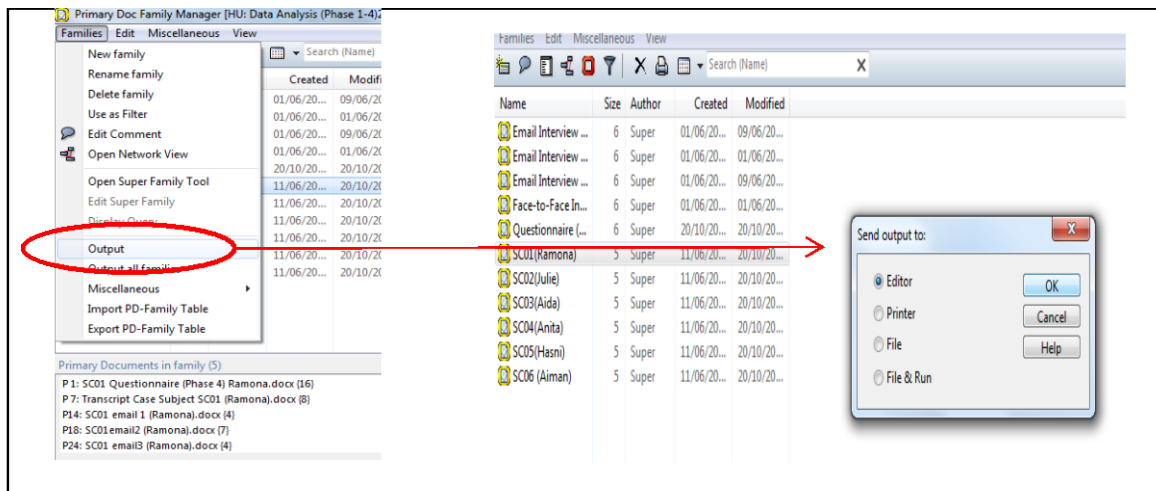
In a nutshell, the capabilities of ATLAS.ti with its useful functions as described above have greatly been exploited in this study to facilitate the strategy of member checking. Through this implementation of this strategy, the subject cases through their participatory mode in the data analysis process, add credibility to the qualitative study as they have the chance to react and respond to both the data and interpretation.

Audit Trail

Audit trail or inquiry audit is a commonly used strategy for establishing dependability (reliability), credibility (external validity) as well as confirmability (objectivity). An external auditor who is experienced in qualitative research methods, is asked to examine the processes

of data collection, analysis and interpretation. Through this process of documenting a study and a review of the documentation by the external auditor, the narrative account become credible (Azza, 2013). In other words, the researcher must describe in detail how data were collected, how categories were derived, and how decisions were made throughout the research. As aptly pointed out by this statement: "If we cannot expect others to replicate our account, the best we can do is explain how we arrived at our results" (Dey, 1993, p. 251, as cited in Merriam 1998, p. 207).

Guba (1981, as cited in Krefting, 1991) describes the audit strategy as the major strategy for establishing confirmability and views that neutrality not as researcher objectivity but as data and interpretational confirmability.

In this study, using the functions of codes and memo of ATLAS.ti, the researchers coded and combined (when necessary) similar themes and included their interpretation as well as reflection. Friese (2009, 2012; as cited in Azza, 2013) recommends that memos should be used to support the researcher in the analytical work process, whereby such use creates spaces for reflection, analysis, integration and interpretation. In addition, by utilizing the advantage of the function of memo, analytical work and thoughts of the researchers were linked directly to the relevant quotation and codes; hence enabling the interpretation and reflexivity process to be captured within the context.

Yin (2003, as cited by Creswell, 2009) proposes the need for qualitative researchers to document the procedures of their case studies and to document as many steps of the procedures as possible. He also recommends setting up a detailed case study protocol and database. As explained and described in details above, the researchers in carrying out the qualitative inquiry have explored potential applications of various functions of ATLAS.ti 7 in facilitating documentation and setting up of protocol of this case study research. Such documentation and case study protocol would in turn, facilitate the audit trail and thus enhance trustworthiness and ultimately the quality of the research.

Discussion

It is obvious that, through the description of the strategies above, the use of ATLAS.ti helped and supported the researchers in the analytical process of coding and analysing of textual data, made data easily accessible to research collaborators as in inter-raters and research participants (subject cases) and thus enhanced the substance and trustworthiness of the research. Moreover, specifically for case study research, both Lee (1999) and Yin (2003) encourage the use of good protocols to substantiate qualitative research (as cited in Sinkovics, Penz, & Ghauri, 2008). Based on the researchers' experience of exploring the potentials of memo and comment functions of ATLAS.ti in logic and transparent documentation, this paper advocates the use of CAQDAS in setting up such protocol.

ATLAS.ti has a wide range of various functions. Admittedly, this paper only highlighted the several functions which were used and explored by the researchers who have still limited knowledge and skills in using the software. Nevertheless, as explained in details above, it is undeniable that the functions used in this study facilitated the data analysis process and enhanced trustworthiness of the qualitative inquiry. For example, the Network View Manager (NVM) was of paramount importance as similarly noted as such in Rambaree (2014). Through this particular function with combination of other relevant functions such as the Code Manager View and Families Manager View, it enables codes were imported to create categories of concepts for eventually looking for a logical patterns or themes. Its function of the Network View also facilitates the strategy of member checking in this study (refer Figure 4 and Figure 7) as the network view could be saved as a graphic file and easily made accessible to research participants by emailing them or use of sharing and collaborating

tools such as Google Drive. However, despite discovering its potential in facilitating inter-rating coding procedure, in this study, the researchers did not utilize this potential due to the restriction of time as well knowledge and skills of the research collaborators as inter-rater for the coding procedure.

Even though, the strategy of thick description was not included in the scope of the paper, through procedure of the audit trail and the process of documentation and setting up of the case study and database, the researchers have also managed to convey thick description of the phenomenon under the qualitative inquiry and provide a "baseline understanding" with which the results of subsequent work could be compared and transfer. In addition, the profiles of the subject cases in their different settings and geographical locations might also enable a more inclusive and overall complete picture to be captured. As such, the issue of transferability in terms of qualitative definition was also addressed indirectly.

Conclusion

In conclusion, this paper has reaffirmed the positive views of past literature on the use of CAQDAS, namely ATLAS.ti; highlighting its contribution, specifically in the strategies of triangulation, member checking and audit trail in enhancing trustworthiness in the case study research. In particular, the paper justifies its value in supporting case study researches through its capabilities in facilitating the setting up of a detailed case study protocol and database with its memo and comment features. Nevertheless, as aptly warned by Clarke and Braun (2013), any use of CAQDAS does not replace knowledge of an analytical approach. As a conclusive note, CAQDAS do not analyse data, they simply aid us to manage them during the analytic process. Thus, it is important that researchers need to have a prior sound understanding of qualitative data analysis and methodological approaches in order to explore and optimize the benefits or potentials offered by the software (Rambaree, 2007, 2014). Nevertheless, in a nutshell, as Carcary (2011) puts it "…CAQDAS is merely a support tool, but when used effectively it enables the researcher to concentrate his or her energy on the conceptual work of analysis" (p. 23).

The use of ATLAS.ti in this paper is limited to solely text data and thus does not address how to handle other data fornats such as video and other digital media formats. Hence, analysing artefacts in digital media formats using ATLAS.ti will be addressed in future review.

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Author Note

Ang Chooi Kean has been involved in teacher education since 2005. She is currently a master Japanese language lecturer at Institute of Teacher Education International Languages Campus, Malaysia. She is also currently a part time PhD candidate at National University of Malaysia. Among her current interests of fields of studies are self-monitoring skills, learning awareness, e-learning, e-portfolio and continuing professional development. Correspondence regarding this article can be addressed directly to: ackean05@gmail.com.

Dr. Mohamed Amin Embi is a professor of technology-enhanced learning at the Faculty of Education, Universiti Kebangsaan Malaysia (UKM). Presently, he is the Director, Centre for Teaching & Learning Technologies, UKM. Correspondence regarding this article can also be addressed directly to: m.amin@ukm.my.

Dr Melor Md Yunus is an Associate Professor of Technology-enhanced Language Learning at the Faculty of Education, Universiti Kebangsaan Malaysia. She is best known for establishing the integration of ICT in teaching and learning English as a Second Language research. Correspondence regarding this article can also be addressed directly to: melor14@yahoo.co.uk.

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