Assessing Quality of an Interpretive Educational Technology Research

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Abstract: - It is a difficult task to assess the quality of an interpretive educational technology research. As the field of educational technology emerges, there is an increasing need for guidelines on how to conduct an interpretive research and assess its quality. Although interpretive research enriches the understanding of a social phenomenon, the prevalence of questionable and unreliable conclusions is a problem in educational technology research. Thus, this paper discusses two levels of problems: firstly, the social phenomenon for which an interpretive research provided useful insights; secondly, the research design process regarding how to conduct and assess the quality of research findings. With the help of Klein and Myers' seven principles, the paper demonstrates how to conduct an educational technology interpretive research and assess its quality. The paper concludes that the use of Klein and Myers' seven principles of evaluating interpretative research has potential for improving the quality of interpretive research in the emerging field of educational technology.

Key-Words: - interpretive research, knowledge sharing, Dynamic FAQ

1 Introduction

Education is a complex social phenomenon whose quest for insight has led to educational technology researchers using the interpretive research paradigm. The aim of an interpretive research is to unravel meanings that underlie a social phenomenon including the identifying the basis and sources of social reality. The increasing number of researchers using the interpretive approaches in the field of information systems (IS) led "researchers, reviewers, and editors to raise questions about how interpretive field research should be conducted and how its quality can be assessed" [1]. As a response to these questions, Klein and Myers developed a set of principles for conducting and evaluating an interpretive research in information systems. Despite the merits of the principles, "a number of well-reputed IS papers do not fulfill Klein and Myers' seven principles" [2]. In this paper, Klein and Myers principles' are applied to an educational technology research. The underlying premise of this paper is that educational technology research suffers from similar predicaments as IS research in terms of the challenge of how to conduct an interpretive research and assess its quality.

2 Background

An interpretive research approach helps to understand the basis, source and meanings that underlie the phenomenon of informal knowledge sharing among students. To accomplish this, we used a special purpose anonymous web-based knowledge-sharing tool called the Dynamic Frequently Asked Questions (DFAQ) developed to both facilitate the interaction and to capture artifacts of interaction. The context of the study was the post-apartheid South Africa where "as a consequence of the tumultuous history, learners at higher institutions of learning came from diverse educational backgrounds and had different learning needs" [3]. One of the educational challenges we faced was that of how to "facilitate equitable access to tertiary learning institutions for those who had been previously excluded as well as implementing models of learning and teaching that were sensitive to the differing learning needs of heterogeneous learners" [4]. Anecdotal

evidence showed that these learners passively attended lectures but consulted informally with peers outside the classroom.

We saw the phenomenon of informal consultation as a teaching and learning opportunity in the following ways:

a)   Consultations were limited to clusters of friends

We observed that students formed clusters within which they informally consulted. The basis of cluster formations were social-historical backgrounds, personalities, etc., and not necessarily on peers who are knowledgeable. We inferred that students were collaborators and already engaged in knowledge sharing. The challenge lay in how to exploit the existing collaborative "spirit" in clusters while widening access to knowledgeable peers beyond the limitation of a single cluster.

b)   Students learnt from one another

Informal consultation within clusters suggests that students learn from one another. We saw an opportunity for exploiting an existing student support system to provide personalized scaffolding. The challenge was that we did not know what students learnt from one another and that information shared in one cluster was not available to other students. Consultations were therefore lost due to lack of record keeping.

…the problem with this temporality of consultation instances is that valuable knowledge that is exchanged during consultation sessions is lost and learners with questions / problems continue being deprived of knowledgeable peers because they have no way of knowing which user knows the answer to specific problems [5].

The other opportunity was that addressing the problem of "lack of persistence" of consultation sessions would not only provide diagnostic information but would result in a knowledge sharing resource for the benefit of a community of learners. Thus, the purpose of the interpretive research was to gain insight into the social reality of informal consultation from the standpoint of students. To achieve this goal, the following development problems were critical:

2.1   The problem of access to knowledgeable peers

The problem of cluster-based consultations was that students consulted with friends and not necessarily with knowledgeable peers. The anonymous consultation using a web-based DFAQ environment allowed users to focus on the content of messages and not on the source hence extended access to knowledgeable peers. The asynchronous text-based communication allowed messages to be accessible at the convenience of a student.

2.2   The problem of access to shared knowledge

The asynchronous nature of DFAQ mediated knowledge sharing allowed students to access a peer's consultation sessions. DFAQ was both a medium of interaction and an outcome of interaction. The outcome was a knowledge resource based on informal consultation. DFAQ provided students with access to shared knowledge.

2.3   The problem of access to "mental structures"

DFAQ facilitated the construction and de-construction of knowledge. Acquisition of new knowledge involved the construction and de-construction of prior knowledge. The knowledge students shared with one another was *ex nihilo nihil fit* (did not come from nothing) but was an outcome of social structure. As a prelude to a discussion on the principles used for conducting and assessing the quality of the research process, the next section describes the analytical framework that was used. Thus, the objective of the framework is to contextualize Klein and Myers' seven principles discussed in detail in section 4.

3   Analytical Framework

Fig.1 depicts the multi-methodological approach used in the research. The framework is based on the three dimensions of informal knowledge sharing a) artifacts of a consultation which persisted beyond a consultation session (text), b) process of posting messages in the

DFAQ environment which peers read, interpreted and responded to (interaction) and c) the biases and influences of society/background

knowledge that students drew upon during interaction (social action).
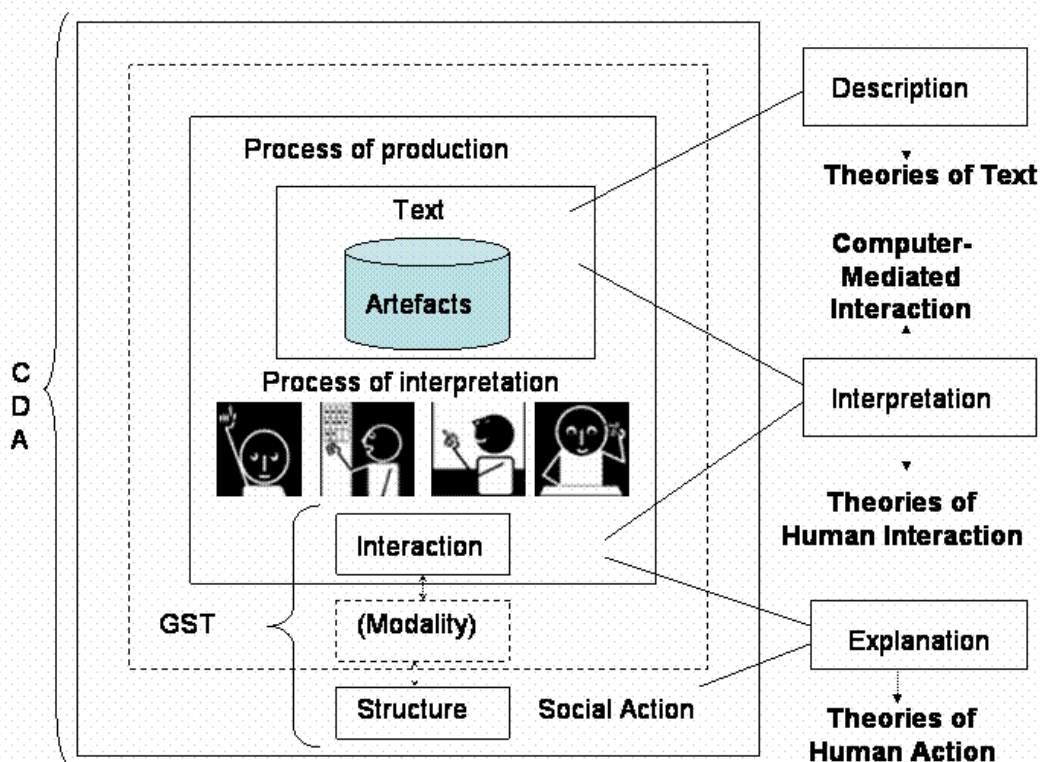

Fig. 1 CDA-GST Analytical Framework (Source: Ng'ambi, 2004)

Critical Discourse Analysis (CDA) [8] was used as an overarching framework augmented with Giddens Structuration Theory (GST) [9]. GST helped to analyse the sources or modalities students drew upon during interaction. CDA linked texts at a micro-level (the textual level) with macro-level structures (social-cultural practice) [10]. CDA was seen as a complementary and suitable *partner* for Structuration theory. The problem with Structuration theory is that it lacks methods to put it into practice and CDA lacks theoretical underpinning. Thus, the interweaving of the CDA and GST provided a way of using CDA as a method and GST as a theory and vice-versa. Referring to CDA as a method, "there was no guiding theoretical viewpoint that was used consistently with CDA, and CDA protagonists failed to proceed consistently from the area of theory to the field of discourse and then back to theory" [11]. The integration of GST into CDA served as a multidimensional, multifunctional

and historical discourse analysis. A method of discourse analysis must fulfil the following requirements [8]: Firstly, it would need to be a method of multidimensional analysis. Secondly, it would need to be a method for multifunctional analysis. Thirdly, it would need to be a method of historical analysis. Fourthly, it would need to be a critical method. The relationships between discursive, social and cultural change are typically not transparent for the people involved.

Theories of text served to describe the artifacts. The interpretation of interaction by theories of computer-mediated interaction and the theories of human action explain the interaction from the social actions viewpoint. Detailed discussion on these theories is beyond the scope of this paper.

The next section outlines the seven principles and discusses the application to an interpretive research process.

4   Evaluation of the research process using Klein and Myers' Seven Principles of Interpretive Research

Klein and Myers [1] contend that an interpretive research ought to satisfy the following principles:
1. The principle of hermeneutic circle
2. The principle of contextualization
3. The principle of interacting between the researcher and the subjects
4. The principle of abstraction and generalization
5. The principle of dialogical reasoning
6. The principle of multiple interpretations and
7. The principle of suspicion

The application of each of the principles now follows:

4.1   The Fundamental Principle of the Hermeneutic Circle

This principle states that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form. This principle of human understanding is therefore fundamental to all the other principles.

The application of this principle involved two steps: showing that the research process was consistent with the hermeneutic rule; establishing recursion between mental structure (thoughts) and human actions. The hermeneutic rule states, "...we must understand the whole in terms of the detail and the detail in terms of the whole" [12]. This rule suggests a circular relationship between the detail and the whole. I inferred from the hermeneutic rule that we understand details, such as discourse (text), in a broad social context of interacting human agents. It also follows that no understanding of social context was possible without understanding the details. The word *understand* was used to mean "the anticipation of meaning in which the whole is envisaged becomes explicit understanding in that the parts are determined by the whole, themselves also determine this whole" [12].

The recursive nature of structure and actions, premises Giddens' argument that structure enables and constrains human actions. The same structural characteristics participate in the subject (the actor) as in the object (society) [9]. In this study, details (text) are an outcome of computer mediated social interaction. Individual students posted questions and received responses from peers and these messages or artefacts constituted a knowledge resource which was available to students and the educator. Thus, the study involved iterating between analysis of interdependent meaning of DFAQ artefacts and the social context of production of artefacts whereby satisfying the principle of Hermeneutic Circle.

4.2   The Principle of Contextualization

This principle demands the critical analysis of the social and historical background of the research setting so that the intended audience can see why the current situation under investigation emerged.

Section 2 discussed the social and historical background of the research setting. Anecdotal evidence showed that learners were unable to read actively, preferred to consult peers outside the classroom session rather than ask questions in class, and were generally underachieving. The learners appeared unable "to appreciate their role as active cognising agents engaged in constructing meaning from text." [4]. The research sought to leverage existing informal collaborations among learners, and to gain insight into the basis and source of the social reality that underlay informal knowledge sharing.

The research was conducted in 2003-2005 with part-time education honors students and full-time commerce students. Students used DFAQ to anonymously ask and respond to question relating to a learning task. Students reflected on their process of producing and interpreting anonymous postings through focus group discussion. Both the analysis of artifacts and the self-reflective process were interpretive.

To the extent that the study has taken a critical reflection on role of anonymous computer-mediated knowledge sharing among learners, the principle of contextualisation was applied.

4.3 The Principle of Interacting Between the Researchers and the Subjects

This principle requires a critical reflection on the social construction of the research materials (or "data") through the interaction between the researcher and participants.

The interaction between the researcher and participants was technology-mediated. The assumptions that premised the research design were that learners preferred to consult informally with peers because they felt *safe* with peers rather than with an educator. A special purpose consultation tool, DFAQ, used anonymity in communication to create the "privacy and safety" that learners felt when consulting with peers. Anonymity shifted focus from the physical cluster membership (consultation based on friends) to *knowledge clusters* (consultation based on message content). Thus, anonymity created the desired *safety* and *asynchronousity* allowed learners to self-pace and model interactive behaviour with peers.

The interaction between the researcher and the students was therefore at two levels: a) through the DFAQ as a surrogate; and b) through transcripts of unstructured focus group discussion.

4.4 The Principle of Abstraction and Generalization

The principle requires that the relationship between the idiographic details revealed by the data interpretation, through the application of principles one and two, and the theoretical general concepts that describe the nature of human understanding and social action are highlighted.

The use the CDA-GST framework discussed in section 3 provided a way of addressing this principle. Fundamental to CDA-GST framework are the three dimensions: artifacts of

DFAQ mediated interaction (text); Interaction involving production and interpretation of text messages; explanation for human actions and behavior from the perspective of interacting agents (transcripts from focus group discussion).

The framework facilitated a back and forward analysis between the text, its process of production (interaction) and the source of social reality that underlay the human interaction.

4.4.1 Text
The outcome of DFAQ mediated interaction was digital artefacts. The theories of text, in particular the Speech Act Theory [13][14] and Semantic Networks [15], were used to analyse the artefacts.

4.4.2 Interaction
Communicative Action Theory [16] was used to recast a student as both initiator of an interaction and a product of an interactive process. This transformative action suggests artefacts of human interaction contain useful diagnostic information about knowledge levels of interacting agents.

4.4.3 Social practice
As a dynamic digital genre, DFAQ served as a social system which mediated informal consultations among learners. In order to gain insight into the basis and source of social reality, Giddens Structuration Theory [9] was used to analyse the DFAQ mediated interaction in terms of the production of interaction, and as a media of the reproduction of the structural components of systems of interaction.

4.5 The Principle of Dialogical Reasoning

This principle requires sensitivity is given to possible contradictions between the theoretical preconceptions which guided the research design and actual findings with subsequent cycles of revision.

According to Giddens, a social contradiction is "an opposition or disjunction of structural principles of social systems, where those principles operate in terms of each other but at the same time contravene one another" [9]. The application of dialogical reasoning provided a way of unravelling the contradictions between

preconceptions that premised the research and actual findings. The term *contradiction* is not to be confused with *conflict*. Conflict "is about the struggle between actors or collectivities expressed as definite social practices" [9] whereas contradiction is "bound up with the finitude of being, and hence with the pervasiveness of becoming" [9]. Giddens contends that contradictions are high-level structures, which shape human interaction. The relationship between contradictions and human actions is emphasised:

Human beings exist in contradictory relation to nature because they are in and of nature, as corporeal beings existing in material environments; and yet at the same time they are set off against nature, as having a 'second nature' of their own, irreducible to physical objects or events [9].

In view of the above arguments, the following contradictions were observed:

The first preconception was that text messages were permanently fixed expressions of life which had to be understood. In a face-to-face interaction two or more agents engage in a conversation without a mediating agent. The assumption was that text serves as a surrogate representing its author's meanings and intentions. Empirical evidence showed that text messages were not fixed expressions of life. The interpretation of text and meaning making processes were dependent on the modalities that learners drew upon. This was consistent with Giddens' assertion, "...a text is not to be regarded as a 'fixed form', which is then somehow related *en bloc* to particular intentions; it should be studied as the concrete medium and outcome of a process of production, reflexively monitored by its author or reader" [9].

The second preconception was that the interpretation of text messages was not about the acquiring of information based on what is already known and understood but rather on working-out the possibilities that text is projecting on a reader's understanding.

Findings from the research showed that informal knowledge sharing was limited to what learners already knew and understood. Although some unexpected outcomes were observed where the meanings of message differed from what the author intended, there was no evidence of learners attempting to work-out possibilities that a piece of text projected.

The third preconception was that there were only three dimensions in an interactive engagement: what was spoken or written (text); the interaction between people which involved the production of text; and social context of the interacting agents. The findings revealed that a medium of interaction (e.g. DFAQ) was a fourth dimension and may have influenced human interaction. This view is consistent with Habermas' view that "communication using technological support or computer mediated communication can have an influence on validity claims" [16].

4.6 The Principle of Multiple Interpretations

The premise of this principle is that sensitivity to possible differences in interpretations among the participants as are typically expressed in multiple narratives or stories of the same sequence or events under study is vital. A useful metaphor is that of having multiple witnesses each giving an account in their own words how they saw it.

The purpose for applying this principle was to highlight some of the differences in the way students "told their story" having experienced the same sequence of events. The design intention of anonymous interaction was two fold: to create an environment in which learners could feel "safe and confident" to consult with each other; and to focus learners on the content of messages rather than its authors. Empirical evidence showed that for some learners anonymity took away confidence, as this statement shows:

Sometimes I find two responses to the same questions and sometimes two different responses and depending how much I know

about the topic I would then see – well this one did not come from X, but not always.

The view expressed above is indicative of the fact that anonymity may not have shifted all students to begin appreciating their role as active cognitive agents engaged in constructing meaning from text. While some learners reported to have had less confidence in the messages whose sources they did not know others reported that anonymity enabled them to overcome their lack of confidence, as this student commented, "I was not sure if I was giving the correct response". In a face-to-face interaction (without anonymity) the student added,

…where you don't have the confidence to speak up in front of other people and you always find them in your classes and wherever you go so it will be good for them as well.

Some learners reported that anonymity allowed them to focus on the subject matter and hence became task oriented.

…for me you all have the same goal as opposed to thinking I don't really know that person, it is just more honest and it becomes more task specific or subject specific, you cut to the chase, there is no airs and graces and nobody gets offended.

According to the statement, anonymity created an "honest" environment by removing the deceptive gain of pretending to know when in fact it was not the case.

One of the goals of DFAQ was to expose learners to a deluge of questions and responses that are exchanged informally among learners. One student reported that,

Whereas, with this (DFAQ), you could actually, for me, one of my biggest learning curves was, um, looking at other people's questions. A lot of mine were answered by looking at how other people think. 'Cause you immediately get things mirrored.

The statement suggested that exposure to other questions had a pre-emptive effect in that questions mirrored the learner's thinking. We inferred from the statement that information

needs were satisfied before being discursively conscious. While the above statement suggested an existence of a pre-emptive effect, another learner reported that exposure to a deluge of questions changed how he/she thought.

And then, the more you read other students' questions, the more you're changing, 'because you constantly have to reflect.

The use of the word "changing" suggested that knowledge was being deconstructed and reconstructed. We inferred that that DFAQ had a cognitive effect on some students. Other students experienced an emancipation effect as this statement implies:

Once you looked at everybody else's questions, you felt freed up to actually ask, and to say to one-another, you know, what about this, and ask one-another questions, you know, and not have the fear of, I've got completely the wrong tail-end.

The artefacts of student interaction were not only accessible by students but also the educator. A faculty staff who convened the course reported that exposure to learner's questions had a diagnostic effect:

But this is almost like having a window on the student's brain and their development, as such. So if they login on different levels, you actually have got a window on their development; you can actually see where they're going.

Finally, other students experienced some sense of consolation and relief. In the statement below the student reported that exposure to others' questions was a source of relief:

…and then, going back and looking at some of the other students' questions, just having this absolute relief of… we're all in the same boat..

4.7   The Principle of Suspicion
This principle requires sensitivity to possible "biases" and systematic "distortions" in the narratives collected from participants.

The principle of suspicion is one of the most rarely applied and yet could be fundamental in ensuring that interpretive research conclusions are above reproach. According to Klein and

Myers, there was considerable disagreement among interpretative researchers concerning the extent to which social research can (or should) be critical, and propose that interpretive researchers use their own discretion on whether or not to apply the principle [1]. Given that the purpose of this paper has been to discuss the application of all the seven principles, it is discussed like other principles.

Although social interaction within the DFAQ environment was anonymity, some suspicion was raised as to the extent of the anonymity. For example, the statement below suggests that the environment may not have been anonymous.

One time we logged in I had one of the students sitting next to me, and he said to me, "Go and rate my question. I want a rating now." And I mean we were joking, wanting to "rate" one-another's questions! But it, in a way it was very true; because you wanted to know what your peers were thinking, because that is somebody that is on the same level as you. You are very much shaped by your peers, and what people are thinking and how they view it. And I know for me personally, that was a big thing.

In the DFAQ environment, interaction was anonymous. It therefore seems odd that a student to asked to have his/her response rated in an environment where postings could not be associated with particular sources.

The second suspicion lay in the fact that not all questions were answered by peers.
A lot of the questions were answered but not all of them, that was the only problem I had but I could go and look at other students' similar questions that had been answered or even have my questions answered by questions, have the realization of what it is that I was missing. So what I did when we logged into the site again was to actually go to those questions that had not been answered and just to look at other students answers to those questions.

In the above statement, the student describes how she found responses to unanswered questions through reading answers to other questions. This suggests that, although students may have phrased the questions differently, they had similar needs for information.

6 Conclusion

In this paper, two levels of problems have been discussed: i) the practical educational problems (see 2.1, 2.2 and 2.3) for which an interpretive research sought to address and ii) the research design problem regarding how the research was conducted and how the quality of the research was evaluated. The paper drew on the principles developed by Klein and Myers' for evaluating interpretive research in information systems and applied them to educational technology research. The use of the seven principles provided a way of thinking both deeply and critically on the research process. There are three principles that were particularly insightful; the principle of dialogical reasoning, the principle of multiple interpretations, and the principle of suspicion. The confrontation of preconceptions (prejudices) in the light of data that emerged led to new knowledge generation or theory generation. The principle of multiple interpretations complemented the principle of dialogical reasoning in that it challenges prejudices through the diverse views on a single issue. The principle of suspicion allowed for a critical reflection on the research process.

Finally, the use of Klein and Myers' seven principles of evaluating interpretative research has potential for improving the quality of interpretive research in the emerging field of educational technology. If the educational technology field is to advance, a point of departure will be improving the quality of its research. In the absence of guidelines on how to conduct and assess the quality of educational technology research, there is a danger of proliferation of questionable and problematic research findings.

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