

Using Mixed Methods in the Evaluation of Online Discussions

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ABSTRACT

This paper is part of a recent empirical enquiry that observed 2000 postgraduate students within various disciplines in four different UK universities and analysed 6 millions words of online discussions. It managed to connect e-learning to students' learning outcomes and presented a pedagogical model for effective online teaching and learning. This model was validated theoretically and meta-analytically. Moreover, it provided the field with the rationale and the processes for mixing qualitative and quantitative methods for analyzing online discussions.

Goodyear (2001) noted: "Analyzing the content of networked learning discussions is a troublesome research area and several commentators have remarked on the difficulty of connecting online texts to discourse to learning" (Page 62).

This lack of content analysis of online discussions is due to the time required to perform such analyses and researchers still lack a reliable instrument to analyse the online discussions (Hara, Bonk and Angeli, 2000).

Henri (1992) also argued that "research in computer conferencing content is usually restricted to the gathering of quantitative data on participation" (page 122), consequently, leading to possible misinterpretation of the phenomenon.

This paper places the emphasis on the devised methodology and provides evidence for pulling the two poles, inductive and deductive approaches, in an unorthodox marriage. This vital process was not possible without mixing the two paradigms within one study and facilitated empirical rigour, interpretation fidelity, and provided the researcher with strong means for inference quality and plausible generalizations that are mostly needed in the emerging field of e-learning (Mehanna, 2004).

RESEARCH FOCI AND AIMS

The central aspiration of this study was to develop different kinds of research evidence that establish the educational significance of e-learning and their effect on students' learning and outcomes and to establish effective e-learning practice in higher education (e-pedagogy).

Hence, this broad and guiding research question:

How do online discussions facilitate students' learning and relate to students' outcomes?

The answer will be revealed if we target the following two sub-questions:

- *What are the e-learning pedagogies?*
- *What effect do these pedagogies have on students' learning and outcomes?*

The first sub-question called for a microscopic, sentence-by-sentence, analysis of the content of online conferences to tease out the pedagogies employed by students and by tutors. This process had an exploratory and qualitative nature.

Once these pedagogies were identified (as our hypotheses), it was equally important for the research to be in a position to generalize. Therefore, there was a need to confirm their presence in several and different online discussions before measuring their association with students' learning and outcomes. To establish this association between pedagogic behaviours and students' grades, a quantified value for each of the pedagogies was sought in students'/tutors' online work.

Without clear precedents from previous research to guide my choice of the methodological strategies that were likely to be most useful, I needed to explore the possibilities offered by a range of different data-gathering strategies. It was critical to avoid consciously the expectation that, in relation to all strategies employed, any one strategy might be particularly privileged in helping generate the kind of data needed.

This is a situation where a clear understanding of the research purposes has ultimately led to formulating the research questions, which in turn has informed the researcher of the relevant means of data collection. Moreover, these purposes

seemed multifaceted and the research questions required multiple methods that should adequately reflect this complexity.

It became apparent that if this study were to reach its aims, there was a need to employ the two research paradigms (Qual and Quan) in a consecutive manner (stages). Although each of the stages appears to be distinctly qualitative or quantitative, mixing their methods within each stage not only helps answer certain research questions but also facilitates the triangulation within and between stages.

In relation to this, the different methods were evaluated according to the following criteria:

- *Relevance and Validity*: the effectiveness of different methods for generating valid data relevant to the formulated research questions.
- *Mutual Compatibility*: the extent to which the adopted sequence of strategies minimized data distortion and bias, while at the same time achieving maximum compatibility in terms of generating a coherent account of the complex online interactions.

For all of these reasons, the mixed methods approach was most compatible and allowed the researcher to answer different research questions within one study that were not possible to be answered with one single paradigm.

A Definition for Mixed Methods and the Sequential Model

Creswell (2003) has noted that a multi-method methodology is one in which the researcher collects, analyzes, and integrates both quantitative and qualitative data in a single study or in multiple studies in a sustained program of inquiry. It can be conceptualised as combining quantitative and qualitative research in a concurrent, sequential, conversion, or parallel way (Creswell, 2003; Tashakkori & Teddlie, 2003).

The dominant aim of this research was first to identify the effective pedagogical practices of e-learning, and later to confirm them.

To interpret the qualitative findings, it was vital to use a deductive approach to confirm the presence of the emerging hypotheses in other cases, and then transform their presence into quantitative numbers or frequencies that are statistically manipulated in order to determine their effect on students' learning and outcomes.

To reach these objectives, Creswell's (2003) model of sequential exploratory procedures fits the purposes of this study. It is characterised by an initial phase of qualitative data collection and analysis, which is followed by a phase of quantitative data collection and analysis (*op cit*, 2003). This is a situation where it is crucial to elaborate on findings from the qualitative data with a follow up with a quantitative method and a large sample so generalizations could be achieved (Morgan, 1999).

Stage One: The Qualitative Inquiry: Grounded theory within a multi-case study approach.

The strengths and primary aims of the case study were to begin to understand the context (in our case higher education in the UK and the literature review) by focusing on a selected number of instances (UK universities that deliver e-learning or degrees online) and then going in more depth by looking at the students and tutors interactions on the discussion boards.

The significant lack of theory concerning the educational benefits of e-learning within a university context put forward the option to generate a theory from case studies (Yin, 2003; Stake, 2000) as most appropriate for the purpose of the study.

'Collective case studies' (Stake, 2000) were adopted to investigate several cases, which are chosen because it is believed that understanding the collection will lead to understanding and better theorizing of a still larger collection of cases.

The adoption of a multi-case (Yin, 2003) study added more breadth and internal generalisations across cases, and helped this study reach its different aims.

While the first case served as an exploratory and a descriptive case (Glaser and Strauss, 1967) to reveal the kind of instructional strategies that were employed in the online discussions, three other cases, explanatory and confirmatory (Yin, 2003), were used to confirm the findings, and provided empirical evidence that demonstrated the association of these strategies with students' grades.

This approach was well-suited to the design and provided the vehicle for the data collection, analysis and interpretation in both the qualitative and the quantitative stages.

Grounded Approach

The grounded approach is a form of field-study that systematically applies procedural steps to develop an exploration of a particular phenomenon. As Strauss and Corbin (1990) explain:

“A grounded theory is one that is inductively derived from the study of the phenomenon it represents. That is, it is discovered, developed, and provisionally verified through systematic data collection and analysis of data pertaining to that phenomenon. Therefore, data collection, analysis, and theory stand in reciprocal relationship with each other. One does not begin with a theory then prove it. Rather, one begins with an area of study and what is relevant to that area is allowed to emerge” (page 43).

Process Used in the Content Analysis

Throughout the content analysis systematic effort was observed to keep an open mind, to use a descriptive level of analyzing the data, and constantly evaluate the emerging categories.

The coding began and every attempt was made to look for clues and actions that have taken place in the online interactions and have had direct a relationship with learning. In other words, the search was for any actions or behaviours that are related to the imparting knowledge or skills. The pedagogic behaviour, or unit of meaning, could be a few words, a sentence or more that have been recurrent in the online discussions. Kaplan (1964) noted: “the bedrock for inquiry is the researcher’s quest for ‘repeatable regularities’.

Once a category had emerged, it was assigned an initial relevant code and detailed notes that describe it.

The first level of coding revealed two broad categories that were based on the main contributors to the online discussions. Tutors’ records and students’ records were coded as the main headings.

After a complete and thorough round of analysis, two more revisions took place. A decision was then made to leave the coding for a period of seven days and revisit it afresh for a third time. Not long before this new revision had started, it became noticeable that the data seemed to have stopped after these categories and it is not revealing more; however a decision was made to continue the check till the last word of the discourse.

Lincoln and Guba (1985), Corbin and Strauss (1987), and Miles and Huberman (1994) suggested that coding and recoding are over when all of the incidents can be readily classified, categories are ‘saturated’, and a sufficient number of ‘regularities’ emerge. The grounded analysis of Stage One appeared to be saturated in the sense that no more new categories were emerging. Therefore, a decision was made to focus on the existing categories and compare them across several examples in order to give each a final and valid definition.

Operational Definition for Each Category

An operational definition for each category is not only important for the researcher to have a clear and reliable coding map but also adds validity to the instrument, and facilitates the inter-rater reliability check and the replication. Weber (1990) noted: “To make valid inferences from the text, it is important that the classification procedure be reliable in the sense of being consistent: Different people should code the same text in the same way” (page 12). One of the most critical steps in content analysis involves developing a set of explicit recording instructions. Miles and Huberman (1994) noted that clear operational definitions are indispensable, so they can be applied consistently by a single researcher over time and multiple researchers will be thinking about the same phenomena as they code.

Stage Two: The Quantitative Inquiry

Introduction

The purpose of this stage was to provide an answer to the research question “*What effect do these pedagogies have on students’ learning and outcomes?*”. Its cause and effect nature necessitated a completely different approach to the other research questions. The aim was to determine the relationship between the emerging hypotheses (independent variables) and students’ grades (a dependent variable) in a population. This necessitated a quantitative approach and statistical analysis of the data. Once this was done, confirmation for the 29 pedagogic behaviours that had emerged from Stage One would be established, and evidence for their associations with learning would be provided by measuring their effect on students’ outcomes.

As we have seen, the first stage led to the coding schedule applied in this stage as the analytical framework for the content analysis with the aim of confirming these hypotheses. Hence, its hypothetico-deductive nature.

Hypothetico-Deductivism

Ever since Newton (1643-1727) developed it, scientists have embraced it as a safe approach to logical generalisations. Essentially, one starts with a hypothesis (a hypothesis is basically a provisional theory) and then deduces what we

would expect to find in the empirical world as a result of that hypothesis, hence the name Hypothetico-Deductivism (HD) (Gemes, 1992; Clark, 2000).

HD is characterized by the view that research starts by deriving hypotheses, in our case the emerging pedagogies, which are then tested for truth or falsity by means of statistical evidence. In our case the interpretation, verification and falsification is achieved once the link of these pedagogies to learning is measured.

In Stage Two of this study, the frequencies were observed and counted according to each student.

For added rigour, the frequencies were converted into percentages. This allowed more calculations and comparisons between students and across groups to be done.

The following process was adopted:

- Each unit or week was looked at in terms of number of files posted, how many words were there and how many times they were read.
- How many messages were posted per students and per tutor
- The discourse was downloaded and converted into RTF (rich text files) in order to load the data and code it using NViVo software as a database handler.
- Each strategy coded above was observed in each unit/week separately. 29 categories were observed resulting in 29 nodes.
- These occurrences were counted depending on their occurrence in each node and later analysed using SPSS.

Anova test was performed to examine the mean for each pedagogy and compare its occurrences within groups and across groups.

Correlations were then calculated for the strategies and students' grades as well as the totality of these strategies used with students' grades.

The 29 strategies were then collapsed into 9 clusters according to their conceptual and theoretical ties.

Effect sizes were then calculated for each cluster and 200 students' grades. All effect sizes showed educational significance and ranged from medium to large according to Cohen's (1988) classification .

CONCLUSION

This study employed sequential mixed methods within a pragmatic stance. They were implemented to answer different kinds of research questions. Throughout rigour, consistency, and verification were maintained.

As a result, in the first stage, a year-long grounded analysis for the one million words of online discussions helped the development of a coding schedule. This was further tested in stage two to confirm its reliability within five million words of online discussions.

Although the grounded approach, employed in Stage One, and hypothetico-deductivism, employed in Stage Two, offer different accounts of inquiry, they share the view that scientific theories explain and predict facts about observed data (Haig, 1995). Emerging clues from the first stage of this study was further corroborated and falsified in Stage Two. This was achieved by pulling the two poles, inductive and deductive approaches together in an unorthodox marriage that showed that grounded theory and hypothetico-deductivism are compatible and could complement each other. The weaving of inductivism and deductivism was not only implemented to satisfy both extremes, but to provide factual evidence that leads to plausible generalisation. The whole process was not possible without the mixed methods approach that accommodated both paradigms within one study and facilitated empirical rigour, interpretation fidelity, and provided the researcher with strong means for inference quality and plausible generalizations that are mostly needed in the emerging field of e-learning (Mehanna, 2004).

Table 1: Summary of Methodology

Implementation	Qualitative (1) Quantitative (2)
Priority	Equal
Sample	Purposive (1)

	Probability within Purposive (2)
Data Collection	Qualitative (1) Qualitative and Quantitative (2)
Research Tools	Content Analysis, (main) Interviews, Observations and Questionnaires (complementary) (1) Content Analysis (main), Content Analysis, (main) Observations and Questionnaires (complementary) (2)
Stages of Integration	Interpretation phase (1)
Analysis	Qualitative (1) Qualitative – Quantitative (2)

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