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Assessing student contributions to online discussion boards

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Abstract

The use of online learning is prevalent in higher education, in particular the use of Blackboard and other similar virtual learning environments (VLEs). Students' participation in online discussion forums is a common activity and the online threaded discussion tool provides opportunities for students to:

- form collaborative groups for problem-based learning
- discuss learning experiences
- ponder over assessment issues
- debate topics of interest.

There is no shortage of research on the perceived effectiveness of online discussion forums; however, this paper evaluates the potential for assessing the content of online discussions as a means of contributing to summative assessment.

Introduction

The use of online learning is prevalent in higher education, in particular within virtual learning environments (VLEs), such as Blackboard; participation in online discussion forums is a common activity. Considerable research exists on the potential of using the discussion board for socialisation (Fauske and Wade, 2003), discussing learning experiences (Hammond, 2000), assessment issues, and debating topics of interest (Laurillard, 2003). Within my institution, discussion boards have been used as a collaborative tool across a range of information communications technology (ICT) modules to promote discussion and reflection. The nature of the subject often requires a disproportionate amount of time developing skills in using software tools, to the detriment of discussion and reading time.

Opportunities for wider reading and discussion are crucial to the learning and they afford opportunities for students to discuss and question key research in the field, by observing the contributions of others and offering alternative viewpoints. As student commitment and co-operation is crucial to this process, it was hoped that by making discussion board participation an assessed element, student engagement would increase in both quantity and quality. This feasibility study therefore looks at the issues that arise in applying a content analysis tool (the Newman model) to assess students' contributions to online discussion forums.

Numerous publications exist on the benefits of eLearning, online learning and use of computer mediated discussion (Salmon, 2000), but information focusing on analysing and assessing discussion threads is not so well researched (Hora and Kling, 1999). Existing research in health-related journals focuses on discussion board use as a tool for initiating discussion and engaging students in problem-based learning scenarios (Braidman et al., 2008), where the participation in online discussion is qualificatory (some contribution is required to obtain a pass), and not contributory (counts towards the final grade awarded). Analysing discussion postings for purposes of assessment that would derive quantitative results requires a specialised tool, some of which are discussed here.

Within the subject of ICT education, in my institution, many assessments comprise coursework portfolios and/or the development and creation of a physical resource with accompanying narrative. Historically, student teachers have often focused on skills development of learning new software for the portfolio resource, rather than engaging with the wider reading about how the created resource contributes to pupil learning. Despite weekly discussion-board topics being set up, students often fail to participate in this element of the course, and thus arrive at sessions ill-prepared to contribute to the ongoing discussions. The revalidation of the ICT education degree courses provided an opportunity to take a fresh look at assessment issues, and the idea of piloting students' postings to the discussion board as a compulsory assessed element, was considered.

The research and review of literature

Considerable research has been undertaken on how the use of a discussion board can be used more productively to contribute to learning and teaching (Benigo and Trentin, 2000; Meyer, 2003), but little has been written on how it can inform course assessment. Encouraging students to participate in online discussion is problematic, but the use of effective questioning techniques (scaffolding the discussion) has been shown to elicit higher-quality responses and fewer off-task postings (Cho and Jonassen, 2002; Wang, 2005). Others perceive this scaffolding as enforcing a constrained forum and directing students down one particular path (Rush, 2004). Wang's study (2005) demonstrated that the use of effective questioning techniques elicited better-quality responses from students and also encouraged higher-order thinking.

Similarly Im and Lee's (2004) topic-related discussion resulted in substantial learning because students had time to reflect before participating in online discussion forums. Garrison, Anderson and Archer (2001) also supported the use of online discussion as being significant in developing critical thinking skills, resulting in a more structured forum than face-to-face communications. There is no doubt that as a tool for socialisation, the use of online discussion boards allows students extended opportunities to contribute to discussion ideas (Salmon, 2000; Garrison et al., 2001). The concern, however, is that these 'results' may be viewed as subjective, unless the data can be analysed with a tool that would make the system transparent.

Early work in the field (Henri, 1992) analysed the content of online postings by measuring four factors:

- social
- interactive
- metacognitive
- cognitive.

with the cognitive factor being further broken down into five types of reasoning skills. Fisher (1997) identified types of discussion as:

disputational, cumulative and exploratory

resulting in the 'dialogical' framework as described by Wegerif and Mercer (1997). More recently, Riley (2006) argued that his:

...content analysis of the online discussion through a dialogical framework for social modes of thinking to measure social reasoning...

and

...keyword identification and concept mapping connectivity to measure conceptual transfer from the online discussion to individual students and higher order thinking...

(numerical frequencies of participation, talk type and triangulation of data using concept mapping) could be applied as an evaluative tool to assess the quality of the discussion exchange, by assigning a 'talk type' from the dialogical framework. However, as with many other methods, the qualitative measure cannot easily produce quantitative results for the purpose of summative assessment. The amount of subjectivity involved also has to be taken into account. Riley's study commented upon:

...determining the progression of thinking and social interactions taking place online...

but a flaw in this study was the mechanism by which Riley extracted his quantitative data. Using the AutoSummarise tool in Microsoft Word he identified and determined key points and key words by analysing documents and assigning a score to each sentence. If the 'key words' were used often, then the score was increased.

Research by Ahern, Peck and Laycock (1992) studied the whole message, assessing the interaction levels and complexity of response. Zhu (1997) looked at the whole theme of the message, with the elements of:

- participation
- social
- cognitive
- metacognitive

being the variables investigated, but the reliability of those studies is not reported. Mason (1992) in her study, reported on the data derived from the VLE-generated statistics, outlining the number of postings per student and the number of times each was read in the overall discussion forum. Ascertaining the quality of the postings, however, would be difficult to achieve using any of these methods.

Methodology

Preliminary discussions were conducted with 20 ICT subject specialist student teachers across a range of programmes:

- undergraduate primary (pupils 4–11 years)
- undergraduate secondary (pupils 11–18 years)
- postgraduate ICT courses

about the feasibility of assessing their contributions to the discussion board as part of the summative assessment process. To ascertain 'what if?' discussion-board content contributed to 15% of the final assessment mark, discussion on the feasibility of assessing online discussion content ran concurrently with other discussion topics on Blackboard. The first forum posted to all module discussion boards consisted of the following statement:

Online discussion is considered to be a suitable medium to discuss key readings prior to face-to-face sessions. As this is part of the learning process, should your contributions be assessed or not?

The second forum was a structured question relating to the pre-reading for the module. Students were given a research paper (Ogborn, 1998) and the question posed was:

Is computer-based modelling more viable as an individual activity or as a group activity? Argue the case for group activity.

Students used questioning techniques to facilitate initial discussion and were invited to consider the assessment of each other's postings by applying the Newman content-analysis tool to gain an understanding of how a raw mark could be derived for assessment purposes. They were reassured this was primarily an experiment to determine how easily the content could be graded.

From the outset, students were aware that they were part of a pilot in determining the feasibility of assessing the content of their online discussions using a quantitative tool. The student cohorts agreed to have their data analysed using a range of tools for this small-scale study. Initially, this was going to be tutor led, with the tutor applying the tools and deriving a 'mark' dependent on the results of the data analysed. After many attempts at applying various tools, the plan was amended and students were asked to peer review the data, thus allowing them to develop an understanding of the transparency of the process.

For the purpose of deriving a mark for the content, it was evident that a tool that could be applied in a quantitative way was required. Two tools that appeared to be fit for purpose were the Interaction Analysis Model (IAM) (Gunawardena, Lowe and Anderson, 1997) and the Critical Thinking Model (Newman, Webb and Cochrane, 1997). Although Newman's original model was fairly dated it has been extended by Kirschner et al. (2004) who proposed four elements:

- contribution
- verification
- clarification
- elaboration.

Unfortunately, although this version was simpler to use, it did not provide the necessary transparency to award a grade. With the original Newman model, a formula could be applied and a result calculated.

Following the debate on computer modelling as a group activity, and subsequent postings to the discussion board, students applied the analysis tool to the content by selecting ten categories as defined by Newman:

- 1 relevance
- 2 importance
- 3 novelty
- 4 outside knowledge
- 5 ambiguities
- 6 linking
- 7 justification
- 8 critical assessment
- 9 practical utility
- 10 width of understanding.

For each statement or paragraph, students had to apply a plus (+) or minus (-) factor to specific statements.

Figure 1 Subset of Newman et al. codes (1996)

Category complete list Relevance, Importance, Novelty, Outside knowledge, Ambiguities, Linking, Justification, Critical assessment, Practical utility, Width of understanding		
Category rating examples	Positive indicator	Negative indicator
R+ Relevance	R+ Relevance statements	R- Irrelevance statements diversions
I+ Importance	I+ Important points/issues	I- Unimportant, trivial points/issues
N+ Novelty. new info, ideas, solutions	NP+ New problem-related information	NP- Repeating what has been said
	NI+ New ideas for discussion	NI- False or trivial leads
	NS+ New solutions to problems	NS- Accepting first offered solution
	NQ+ Welcoming new ideas	NP- Squashing, putting down new ideas
	NL+ Learner brings new things in	NL- Dragged in by tutor

The decision to concentrate on the Newman model afforded a calculation feature that allegedly measured the quality of the data and not the frequency of postings as in other methods. The ten categories also had coding subsets to further exemplify the data if required. By applying a code to each sentence or paragraph, the positive indicators and negative indicators could be calculated and results obtained.

Results

The results from this study illustrated that certain categories were easy to identify, namely relevance, linking and justification. Very few students identified critical assessment and some identified difficulty with some of the meanings, for example – *practical utility* and *outside knowledge*. If *outside knowledge* was applied, did this mean that it couldn't be graded for *novelty*? If someone posted a novel idea, could this be incorporated in *width of understanding*? If you widen knowledge does this mean that you slip into the *outside knowledge* category? It was difficult to award a negative rating, as the tool could only be applied if the code category was present. It was therefore not possible to state that an element of the discussion was, for example, not ambiguous. A coding could be applied if something was ambiguous, but if it wasn't, it was likely to be either *relevant*, *important*, *novel* or *outside knowledge*. The whole process, while interesting, was also extremely time consuming and although this appeared the most useful tool for analysing the content, the code categories available did not cover all of the options that the students felt were present within specific postings. The formula applied to the coding comprised the mean of the number of positive and negative contributions, for example 27 J+ codes and 11 J- codes would result in a critical thinking ration for the justification category of 0.16.

Conclusion

Using an asynchronous discussion tool as a means of providing quantitative results for assessment purposes is fraught with difficulty, none less than the strategic stance learners might take in 'writing for the grade' (Elbow, 1997). Statistical data counting the frequency of postings can be easily analysed. The validity of this data, however, is problematic. Student success could not, and should not, be defined to the number of postings, but rather to the quality of the content of those postings.

The Newman model, while the most appropriate tool to date for this task, still resulted in considerable ambiguity. Students analysing their own postings had a clear indication of what they meant and had no difficulty with their own analysis. They were however troubled with the thought that this could be used to derive a grade for assessment purposes, as often their interpretation of other students' postings were difficult to quantify and, by their own admission, were often subjective. The task of analysing the data was onerous and resulted in a wide variety of opinion. Peer agreement of categories was achieved in only three of the ten categories, but the amount of time and effort to derive this result was onerous.

While all the tools provided different types of results, concerns remained about the lack of any mechanism to analyse the literacy aspect within the postings. If these discussions were to form part of the summative assessment, then surely attention to detail (grammar, spelling, sentence construction) would also have to be taken into account? Interestingly enough, part of what is encouraged within higher education (good academic writing; attention to detail; structure) may be largely ignored in an online environment.

Messages (or similar) stating:

... don't worry about spelling or grammar when using the online environment...

often appear as introductions to online activities. Why should the discussion board environment be any less important if it is to contribute to the overall learning and teaching process, and to assessment in particular? It could be argued, however, that the mulling over grammatical detail could detract from the spontaneous use of the discussion board.

This is a 'work in progress', but the indications are that it is not feasible to derive a 'mark' for such an activity. Taking into account the literacy issues, quality of content (where students determine the criteria factors and have added substantially to the Newman categories), quantity of initial posting and responses to other postings, there is still some way to go in developing an ideal tool fit for purpose. While 30% of the students would welcome credit for their contributions to online discussions, the remainder demonstrated a variety of concerns; namely the cumbersome workload, the level of subjectivity, and the fact that they could never be fairly graded. All students conceded, however, that the use of the discussion tool enhanced session participation and were in agreement about pursuing the research further.

As a cognitive tool, the discussion board affords time for the learners to:

- reflect
- share ideas
- learn through observing and interacting with others
- create their own view of the topic.

Isolating a component part of using the VLE and the discussion board tool, in particular for assessment purposes, appeared to detract from the main purpose of engaging with course content to foster deeper learning.

If one advantage of using discussion boards is to assist in the process of learning, it raises the question (for future research) whether it is appropriate to assess the content of those online discussions at all.

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