A conceptual framework for assessing interaction quality in online discussion forums

Dip Nandi and Shanton Chang
Department of Information Systems
University of Melbourne
Sandrine Balbo
Knowledge Media division
Deakin University

The use of discussion forums in education has long been a hot topic in tertiary education. Discussion forums' activities help learners to share and gain knowledge from each other. However, setting up discussion forums does not ensure that learners interact with each other actively and grading of discussion forum participation is done to ensure qualitative learner participation. Currently, a major focus has been put onto the better use of discussion forums, but the way in which quality of participation can be evaluated has yet to be adequately investigated. This paper presents a conceptual model, based on an extensive review of current literature in related areas, as a way forward in looking at the assessment of quality in online discussion forums. The main benefits of the proposed framework are towards facilitators, as a way to assess learners' online contributions, while students may use it to understand what is expected of them as participants in online discussion forums.

Keywords: Higher education, framework, online discussion forum, assessment, quality.

Background

Since the introduction of technology and internet enabled online learning, discussion forums have been used to ensure interaction between learners and instructors (Sharples, 2000, Farmer, 2004). In the online discussion forums literature, there is a lot of emphasis on the benefits that online discussion forums can have and how learners can be more involved in online interaction, but little is said about what quality means in such discussions and how online discussions can be assessed. As early as 1992, different sets of criteria were suggested to analyse online discussion forum contents (Henri, 1992; Newman et al., 1996). Although these criteria provide a platform for categorising and analysing discussion forum posts, there is a lack of a comprehensive framework supporting the assessment of forum participation and interaction.

Existing criteria do not focus on interaction or engagement; instead they focus on content and objective measures such as participation rate. Sheard, Ramakrishna and Miller (2003) agreed that using a discussion forum is not just about participation and engagement and as it is necessary to evaluate the learner's engagement to ensure effective participation. From an educational perspective, explicit assessment criteria or marking schemes are particularly important for effective student assessment (Brown, Bull and Pendlebury, 1997). Therefore, the clearer the criteria for evaluating quality of the interaction in online forums, the more effectively academics will be able to make use of online interactions and discussions as an educational tool.

This paper draws from existing literature and attempts to develop a conceptual framework for evaluating the quality of the interaction in online discussion forums. In particular, the paper draws from literature on online learning strategies, the use of online discussion forums, and the assessment of interactive activities to answer the question, How can assessors evaluate quality of the interaction in online discussion forums?

In the paper, we first highlight key issues related to effective online interaction between learners and instructors before presenting the resulting framework to assist the instructors in evaluating the quality of learners' participations and their interaction with other learners.

Online learning and interactivity

The term "learning" has changed significantly over the years and the emphasis is nowadays on learner-centredness and peer-based activities. The advancement of technology and learners' advanced computer skills has made it possible for online learning to develop quickly. Interaction between teachers and learners are now happening increasingly online (Sheard, Ceddia, Hurst and Tuovinen, 2003). Online learning increases the opportunities for learner participation and enhances the participation of learners who may feel more inhibited to engage in discussions in a traditional classroom setting (Dengler, 2008). This has prompted an increase in the amount of research being performed on online learning environments.

Different researchers have defined online learning systems in different ways. Chang and Fisher (2001) described a web based learning environment as consisting of digitally formatted content resources and communication devices to allow interaction. Piguet and Peraya (2000, p. 303), putting more emphasis on the learning, define it as a place where learners and teachers interact with the use of a hypermedia based program or system that uses the attributes and resources of the World Wide Web to facilitate learning.

In the above definitions of online learning systems, interactivity amongst learners and instructors was specified as an important aspect in online learning. Interactivity implies the existence of multiple communication channels between actors. In a class room environment, the actors are the teachers and the learners. Both the conversation theory of learning by Pask (1975) and social constructive learning theory of learning with technology by Brown and Campione (1996) emphasizes the fact that learning, to be successful, requires continuous conversation and interaction, not just between teacher and learner, but also amongst the learners and learner has to act and reflect. Consequently, educators should consider interactivity when designing online learning strategies (Maor and Volet, 2007).

The role of teaching is not simply to convey information but rather to engage learners in actively constructing knowledge (Al-Mahmood and McLoughlin, 2004). The learning system not only acts as a tutor, it also acts as an assistant, communication medium and a guide for the users to create the real life interactive classroom atmosphere (Sharples, 2000). In addition, Murphy (2004) reiterates the importance of promoting collaborative and peer to peer interaction when using online discussion forums.

These definitions highlight the importance of interaction, acting and reflecting actively in online environments. One way to provide online interactivity for learners is via the use of online discussion forums.

Use of online discussion forums

A discussion forum is a ubiquitous communication tool within an online learning environment and significantly shapes the types of communication that takes place. Discussion forums have frequently been used successfully as communication tools in online learning environments to facilitate interaction between learners to share knowledge (Rovai, 2002; Bradshaw & Hinton, 2004; Berner, 2003). Discussion forums also provide an effective opportunity to exchange ideas and share knowledge amongst learners and instructors (Tallent-Runnels et al., 2006; Levine, 2007). There are many reasons behind the wide adoption of online discussion forums, but the major attribute of a discussion forum is its asynchronous nature that enables learners and instructors to communicate with each other at anytime of the day, and without having to find the time for person-to-person interaction. In addition, posting on a forum enables the discussion to be public and accessible by all other learners in their own time.

From academics' and facilitators' points of view, online discussion forums provide a platform for incorporating and sharing knowledge, deriving and analysing solutions for different problems. Educators have embraced online discussion forums widely. Learners may be requested to participate in online discussions for multiple reasons. In courses that are completely or partially online, learners are encouraged to participate in discussion forums to demonstrate their capability to carry on a discussion and to demonstrate their knowledge of a topic.

The participation may or may not be assessed. On this point, a few authors, including Berner (2003) and Laurillard (2002), note that participation is more active if some sort of assessment is linked to it. Indeed, whether courses are completely or partially online, Burkett, Leard and Spector (2004), Leh (2002) and Seo (2007) all indicated how grade points might be used as an incentive to enhance participation between learners. However, for assessment of discussion forum participation to work effectively, there needs to be

a comprehensively defined framework that can assist the evaluators and students clearly. Having a comprehensive framework can also act as a guideline for participants and educators.

Potential for discussion forum participation

Although Oblinger and Oblinger (2005) note that online discussions are better suited to the digitally skilled learners, we could argue that in today's era, the digital skill is a survival skill that our students learn to master either from a young age or have to adapt to as soon as they enter higher education.

The use and benefits of these forums vary immensely, covering topics as diverse as learner- or teacher-lead discussions, debates, collaboration around set tasks or projects, or set activities (Berner, 2003; Rovai, 2002; Rovai & Jordan, 2004; Bradshaw & Hinton, 2004; Gerbic, 2006). Forums are also used for posting comments on readings, prior to submitting a formal (to be marked) review of the reading, as a memory trigger (looking back at old discussions), to find role models, to get some form of immediate peer review, or for making connections with each others. These activities allow learners to think critically, discuss the topic intimately and learn from others.

Broadly speaking, the above mentioned benefits can be termed as quality online engagement, but on the other hand, research has shown that participation in online discussion forums is not always equal (Poole, 2000; Guzdial & Carroll, 2002; Leh, 2002; Russo & Benson, 2005; Salmon, 2003). There are three main levels of participation (Salmon, 2003):

- Firstly some are "lurkers" i.e. who just read the messages and do not participate. They may learn by reading the posts and incorporating the ideas into their assignments (Guzdial & Carroll, 2002).
- Secondly some learners read the messages and treat them as a notice board posting their own position having limited interactivity.
- Thirdly the participation is interactive and to its full potential (Ho, 2002).

Diversity in online engagement and assessment

The diversity in participation can be defined by the study carried out by Sheard, Ramakrishna and Miller, (2003) who reported that the maturity and motivations of learners have an impact on the online engagement of the learners. On this issue of motivation, Gerbic (2006) and Weaver (2005) identified factors like interest in the topic, feedback from instructors and exchanging opinions that motivate or impact the online participation of the learners.

However, the phenomenon of lurkers is most evident in educational discussion forums where participation and engagement is not compulsory (Sheard et al., 2003; Sheard, Ramakrishna and Miller, 2003). Participation by learners is never guaranteed, especially by those who fail to understand the benefits gained and thus demonstrate their uncertainty by not actively participating in the discussions (Armatas et al., 2003). Research suggests that the strongest motivator for participation is with some form of assessment as learners generally perceive that what is valued is what is assessed (Burkett et al., 2004; Laurillard 2002; Leh, 2002; Ramsden 2003; Sheard, Ramakrishna and Miller, 2003; Seo, 2007).

As pointed by Framer (2004), the lack of guidelines outlining mechanisms for ensuring productive discussion through participation in forums results in ineffective discussion forums. Allocating marks or grades is necessary to make sure that learners participate in the discussion forums (Sheard, Ramakrishna and Miller, 2003). Yet, the question of how grades and marks can be awarded continues to worry facilitators and academics. In addition, assessing the quality of posts is difficult and instructors often look at quantity as an indicator of participation (Dooley & Wickersham, 2007). For that purpose it is essential to propose a set of criteria to help assess participation quality.

Having presented various perspectives on the importance of interactivity when using online discussion forums in higher education; this paper will now concentrate on the criteria that lead directly to our proposed framework that will support educators in their assessments of quality in online discussion forums.

Defining quality in online engagement and evaluation criteria

In this section, we will briefly demonstrate that there is little research that presents a way for assessing the interaction quality of discussion forum posts, before presenting the work by Henri (1992) and Newman, Webb and Cochrane (1996) that directly inspired the proposed framework.

When talking about learners' engagement, Biggs and Tang (2007) points out that one of the three main factors teachers face in supporting students to learn better relies on their levels of engagement. Furthermore, Weaver (2005) identifies the main motivators and de-motivators for learner participation in discussion forums, while Gerbic (2006), not using the term 'de-motivator', presents a list of issues that she believes impact the participation in online discussion forums.

Not directly concentrating on engagement, Clayton (2004) developed an instrument consisting of eight scales to measure the effectiveness of strategies employed in designing an e-learning environment. They were: Computer Competence, Material Environment, Student Collaboration, Tutor Support, Active Learning, Order and Organisation, Information Design and Appeal and Reflective Thinking.

However, none of the above authors directly evaluated the quality of asynchronous discussion forum posts, as their tools mainly provide a measurement for the overall use of online discussion forums. We did not find a lot of research directly defining criteria for content analysis in terms of quality in order to assess discussion forum posts. Garrison, Anderson and Archer (2000, 2001) developed a practical inquiry model that reflects the critical thinking process in asynchronous text-based computer-mediated communication. According to this model, critical inquiry is presented in a sequence of four phases, which are triggering event, exploration, integration and resolution. However it may be difficult to assess quality of posts using this model as it is phase specific. From our earlier discussion we have seen that not everyone participates equally or at the same pace and rate. For some participants, discussion may have reached a certain stage while others may be left behind. However the criteria presented in the enquiry model can be considered independently for assessing discussion forum posts.

Henri (1992) developed a tool for online discussion analysis with five dimensions and suggests that these five dimensions can be used to effectively classify electronic messages. Although Henri's model, as summarised in Table 1, provides an initial framework for analysing discussion forum contents, it lacks detailed criteria for systematic and robust classification of electronic discourse and it remains more of a research tool, than a teacher evaluation device (Howell-Richardson & Mellar, 1996; Hara et al., 1998).

Another model by Newman, Webb and Cochrane (1996) defines ten criteria for assessing the dimensions for cognitive skills: Relevance, Importance, Novelty (new ideas, solutions), Bringing outside knowledge or expertise to bear on problem, Ambiguities (clarified or confused), Linking ideas or interpretation, Justification, Critical assessment, Practical utility and Width of understanding. This model (referred as Newman's model) focuses on the 'answers' rather than the ongoing interaction that should be the mainstay of interactive online discussion forums.

Drawing from both Henri's, Newman's and Garrison's models, Table 1 summarises how assessment of discussion forum is currently conceptualised.

A conceptual framework for assessing quality in online discussion forums

The criteria in Table 1 are essential in developing a framework for assessing quality, but are only the first step. The next step is to define how each criteria can be assessed. It would be easier to assess and investigate the set of criteria in practical if they can be categorized into similar themes. This sort of categorization was also used by Hew and Cheung (2003) while evaluating the participation and quality of thinking of pre-service teachers in online interaction. In order to assess each criteria we separate the above criteria into three broad categories:

- **Content** demonstrating the type of skill shown by the learners. This category covers criteria 1 to 6 in Table 1. They relate to students' postings that show or indicate the expertise of the learners in the topic of discussion and by which the talent of the learners can be assessed.
- Interaction quality which looks at the way learners interact with each other online in a constructive manner. This category covers criteria 7 to 10.
- Objective measures highlighting how consistently or frequently learners participate in discussion.

In order to fully support educators, our framework also provides a sub classification which clearly indicates what may be a poor, satisfactory, good or excellent performance against each criteria. However, the relative importance and the relevance of the criteria that follows depends very much of the facilitators, the subject matter or discipline area, and the cohort and demography of the learners they are assessing. The indicators of what can be considered as a poor, satisfactory, good or excellent performance presented here is based on the authors' previous teaching and learning experience and general perception. The detailed framework is presented below.

Table 1: Criteria for quality
adapted from Henri (1992), Newman et al. (1996), Garrison et al. (2001) criteria

Criteria for quality	Meaning
1) Clarification and critical assessment	Observing and studying a problem and then defining one's opinion about the problem with unambiguous, clear statements so that all can understand why this information should be accepted (Henri, 1992). In addition, advanced students should be able to criticality assess and analyse their own or other's contributions to show that the participants have exercised their analytic skills (Henri 1992; Newman et al., 1996).
2) Justification or judgment	Making decisions by providing proof so that the validity of information is assured (Henri, 1992; Newman et al., 1996; Garrison et al., 2001).
3) Inferencing or interpretation:	Admitting or proposing something on the basis of a proposition which is already proven as true (Henri, 1992: Newman et al., 1996; Garrison et al., 2001).
4) Application of knowledge (Relevance):	Discuss the application of knowledge for solution or making a decision to show that the participants can use their knowledge in different contexts (Henri 1992; Newman et al., 1996).
5) Prioritisation of key knowledge	Giving more emphasis on the important issues on the topic of discussion to show that participants can understand the focal issues in any problem (Newman et al., 1996).
6) Breadth of knowledge:	Widening the discussion by bringing out new insights from the readings which represent the participants' ability to analyse and raise issues (Henri, 1992; Newman et al., 1996; Garrison et al., 2001).
7) Critical discussions of contributions	Students should be able to constructively and criticality assess and analyse their own or other's contribution to show that the participants have exercised their analytic skills (Henri 1992; Newman et al., 1996).
8) New ideas/Solutions	Proposing and advancing new ideas or solutions into discussion to represent the participants' ability to provide solutions (Newman et al., 1996).
9) Sharing outside knowledge	Students should also be able to draw on personal experiences or knowledge and relate these to the texts or lecture notes. This represent the participants' ability to relate to real world situations with current study (Newman et al., 1996).
10) Use of social cues or emotions	The use of informal messages and greetings to see if other participants are enjoying the online conversation or not. Postings may also be used to encourage others to respond and to further discussion. (Henri, 1992).
11) Participation rate	The total number and the frequency of postings to see if the participants are consistent or not (Henri, 1992).

Directions for future research

Due to the nature of the research, and in particular its exploratory nature, the major focus of this paper was to identify key ideas and concepts. In the first instance, the proposed framework needs to be evaluated in context. This work is currently in progress where case studies, interviews and focus groups will be used to support the validation of the framework. However there is also a need to assess and trial the emerging tools and frameworks that evaluate the diverse dimensions of online learning and interaction. Future research needs to be carried out by applying these frameworks in different educational courses and examine the results for appropriate validation. In addition, there are a number of key areas that would benefit from future detailed research like the usability of technology, where the quality of participation may increase with the technology being more user friendly. A look into the future of the technology, and how this technology specifically affects participation within an online environment could prove to be an interesting topic for research. And lastly, professionals are also engaged in online communication now and research in this field could prove to be valuable in the future; this may involve a comparison between the participation and evaluation methods of learners and professionals.

Table 2: Conceptual framework for assessing quality in online discussion forums

	Criteria	Poor	Satisfactory	Good	Excellent
Content	Clarification	Regurgitation of information	An clear explanation of available information	Explaining available information using relevant examples	Articulating available information to expand on ideas presented, including the use of examples
	Justification	No justification of points	Justification based on personal opinion	Justification using existing cases, concepts or theories	Justification using existing cases, concepts or theories and providing clear discussion of implications
	Interpretation	Misrepresen-tation of Information	Basic paraphras-ing of available information	Clear interpretation of available information	Critical discussion of available information
	Application of knowledge (relevance)	No application or discussion of relevance to questions asked	Application of knowledge to questions asked	Application of knowledge including discussion using relevant examples	Knowledge is criti-cally applied and may include discussion of limitations
	Prioritisation	No prioritisation of information or knowledge	Some basic comparison of information	Ability to prioritise information and knowledge	Ability of prioritse information and knowledge based on criteria that learner has established
	Breadth of knowledge	Narrow and limited knowledge	Some indication of a wider view of the topics discussed	Presenting a wider view of the topics discussed by showing a good breadth of knowledge	Ability to point out other perspectives, including drawing from other fields of studies
Interaction quality	Critical discussion of contributions	No engagement with other learners' contributions	Some basic discussion about other learners' contributions	Consistent engagement with other learners' contribution and acknowledgement of other learners' comments on own contributions	Contributing to a community of learners, with consistent engagement and advancement of each others ideas
	New ideas from interactions	No evidence of new ideas and thoughts from interaction	Some new ideas developed as a result of interaction	Some solutions and new ideas as a result of interactions	Collaborative approach to solution seeking and new ideas developed
	Sharing outside knowledge	No sharing of outside knowledge	Sharing generic information that is easily available from outside sources	Sharing real world examples that may not be immediately obvious to other learners	Sharing real life knowledge, personal experience and examples of similar problems/solutions
	Using social cues to engage other participants	No engagement with others in the discussion forum	Answering some basic question posed by facilitator or other learners	Engaging with the work and discussion of other learners	Engaging and encouraging participation with fellow discussants in the forum
Objective measures (this categ-ory is subj-ect to facil-itators' ex-pectations)	Participation rates	None or less then 2 posts per week	Between 2 to 5 posts per week	Between 5 to 10 good quality posts per week	More then 10 good quality posts per week
	Consistency of participation	Rarely posts with occasional activity	Occasional activity	Consistent activity	Consistent and productive activity

Conclusion

The aim of this paper was to provide a conceptual but comprehensive framework for assessing the quality of interactions in online discussion forums. The paper acknowledged the importance of interactivity in online discussion forums. The use of discussion forums in online learning by learners and instructors has proven highly efficient in gaining and sharing valuable knowledge. Enhanced qualitative online participation can make discussion forum activities really productive and, if carefully managed, may even be used as an alternative to the interactive class room environment. In addition, research has shown that

the assessment of these online interactions is a crucial element to promoting and enhancing online interactivity. However, an extensive literature review found little research regarding how the quality of interaction may be assessed for higher education purposes. Therefore, a conceptual model, based on current literature in related areas has been proposed in this paper as a way forward in looking at the assessment of quality in online discussion forums. The main benefits of the proposed framework are that facilitators can use it as a way to assess learners' online contributions; while students may use it a way to understand what is expected of them as participants in online discussion forums.

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Authors: Dip Nandi: d.nandi@student.rmit.edu.au
Shanton Chang: shanton.chang@unimelb.edu.au
Sandrine Balbo: Sandrine@acm.org

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