

# Using Discussion Forums To Support Collaboration

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## ABSTRACT

e-Learning is seen by many as the panacea for those who through circumstances or choice elect to study using digital rather than traditional educational media. While e-learning offers many advantages, it is often accused of being a faceless medium that does little to encourage social exchange, discussion or collaboration.

This paper discusses the on-line learning environment, paying particular attention to the facilities that are provided to encourage cooperation and collaboration. It considers the value of such communication tools in terms of educational pedagogy and the advantages that such activities offer. The paper then investigates discussion forums, and the role they play in encouraging and supporting collaboration. It also presents a model that attempts to assist with the measurement of the collaborative activities of students participating in e-learning courses. The paper concludes by looking at how the model could be further developed and tested and discusses the potential for further study.

The paper will be of interest to those who are involved in e-learning or who are considering its use. It will also be of use to those that value the collaborative communication aspects of education in the e-learning environment and how collaboration can be supported and measured using discussion forums.

Key words: e-learning, collaboration, discussion forums, measurement.

## INTRODUCTION

Discussion forums are gaining popularity as a mechanism for increasing student interaction in the on-line learning environment. They are viewed by many as one of a range of tools that enable on-line course participants to collaborate, share ideas and discuss domain related concepts.

This goal of this paper is to evaluate the role that discussion forums play in supporting collaboration between participants in an on-line learning environment and to present a model that could be used to measure student participation. The

paper commences by discussing the role that discussion forums play in the e-learning environment paying particular attention to the role that they play in promoting collaboration between on-line course participants. A review of educational psychology follows, providing evidence to support the use of collaborative tools in the online learning environment. The paper then considers some of the factors that could affect the behaviour of discussion forum participants and then presents a model that could be use to rank student activity. The paper concludes by looking at areas for further discussion and research.

## **THE ROLE OF DISCUSSION FORUMS IN E-LEARNING**

The discussion forum is one of more popular the technologies used in the delivery of online learning, has its origins in the early days of the Internet where it was used by academics of American universities to promote discussion and collaboration. Unlike text, audio and video conferencing, the discussion forum is an asynchronous technology, which does not require all participants to be online simultaneously. One of the strengths that the discussion forum provides to the online learning community is the ability to allow learners from a variety of time zones to interact at a time that suits the individual learner.

The use of discussion forums has been explored with enthusiasm, Bullen (1998) and Thorpe (1998) discussed how the Internet and computer mediated communication (CMC) could be used to promote student learning in groups. Garrison (1993) suggested that discussion forums had the potential to change the nature of distance education, providing an opportunity for the distance learners to collaborate and create mutual understanding by building learning communities. Mason and Kaye (1990) described computer conferencing as a medium that can provide opportunities for dialogue, debate and conversational learning, suggesting that students gain a sense of community with access to other student's thoughts and ideas. Collins & Berge (1995) discussing the benefits of CMC explain that it has the potential to liberate education from the constraints of time and distance. Dehler and Portras-Hernandez (1998) also discuss the role of discussion forums and how they can be employed to promote experiential learning and collaboration.

## **THE APPLICATION OF PEDAGOGY AND ANDRAGOGY TO THE USE OF DISCUSSION FORUMS IN E-LEARNING**

Support for CMC tools such as discussion forums in the e-learning environment can be found in the field of educational psychology. Discussion forums promote interaction and discussion between learners and assist in building learning communities (Garrison, 1993). Evidence supporting the kinds of activities that

discussion forums promote can be found in the areas of cognitive psychology, constructivist psychology and humanist psychology. Malcolm Knowles' theory of andragogy also provides support for value of discussion between adult learners (Knowles, 1990).

Discussion forums provide a platform that fosters the sharing of ideas (Garrison, 1993), providing a medium where learners can critically evaluate each others ideas and blend elements to create new ideas. Such activities are key cognitive activities identified in Bloom's Taxonomy of Learning (Bloom, 1956).

Although behavioural psychology provides little evidence in support of the use of discussion forums it does provide a strategy for overcoming one of the problems associated with the use of discussion forums in e-learning, which is the reluctance of some learners to actively participate. Brookfield (1989) suggests that the rewarding of activities by the allocation of grades, can be viewed as a component of Skinner's behaviourism. It is not unusual for an instructor to encourage discussion forum participation by awarding grades.

The cognitive approach to learning suggests that learning is the process where novices become experts (Bruer, 1993). Cognitivists suggest that before we accept and learn new ideas we test it against things we already know (Anderson & Garrison, 1995). Discussion forums provide the opportunity to share about what we know and compare new concepts with our fellow learners. Harasim (1990) explains that one of the strengths of on-line education and in particular discussion forums is its ability to facilitate interaction and group activity. The discussion forum provides a mechanism that allows the social affective and cognitive benefits of face-to-face situations to be duplicated (Hiltz, 1990) Instructors designing e-learning courses can use discussion forums to replace the face to face discussions that take place as part traditional institute based learning.

From the principles of cognitive psychology came the concept of metacognition, referred to by many as thinking about thinking. Flavel (1996) describes metacognition as one's knowledge concerning one's own cognitive processes. A key component of metacognition is the awareness of the difference between understanding and memorising materials. The discussion forum allows learners to share experiences, and reflect on the experiences of others while building understanding and aiding the process of the learner moving from novice to expert.

Constructivist psychology also provides support to the use of collaborative tools like discussion forums in e-learning. The principles of constructivism promoted by Piaget (1970) were formulated to address the changes required to cater with the introduction of the rapid changing world of information technology. Constructivist theories of learning highlight the social nature of knowledge, claiming that

knowledge is constructed as result of social interaction (Piaget, 1973). The emphasis on constructed learning and building communities of learners has lead educators to adopt CMC and in particular discussion forums as a necessary tool of distance learning (Kolb, 1994).

Garrison (1993) when discussing the constructivist approach to learning wrote that “learners attempt to interpret, clarify and validate their understanding through constructed dialogue and negation “(p102). As a medium for communication discussion forums are seen as an appropriate tool because they provide opportunities for reflective and thoughtful analysis. Harasim, Hiltz & Turoff (1995) provide evidence in support of conferencing as an ideal environment for collaborative interaction. Harasim, Hiltz & Turoff (1995) state that

“These shared spaces can become the locus of rich and satisfying experiences in collaborative learning, an interactive group knowledge building process in which learners actively construct knowledge by formulating ideas into words that are shared with and built on through the reactions and responses of others. (p. 4).

Of all the communication tools provided to support e-learning, discussion forums do more to promote collaboration and sharing of information. When managed effectively, discussion forums can encourage learners to share information, build on the ideas of others, and construct understanding about the changing world of technology (Garrison, 1993).

Voygotsky (1978) suggests that learning is a social activity, and that people learn by interacting with each other. Voygotsky and other social-constructivists believe that knowledge developed using collaboration is more than what can be achieved alone. Discussion forums if used effectively can promote discussion and encourage collaboration among learners.

Like constructivism, humanism relies on collaborative learning activities that enable the learner to reflect on personal experience. Kramlinger and Huberty (1990) when discussing humanism suggested that learning primarily occurs by reflecting on personal experience and that the role of the instructor is to supplement experiences with new opportunities. The humanist approach places responsibilities for learning on the learner and discussion forums provide opportunities for learners to participate in inductive discussion and demonstrate reflective practices.

Sometimes referred to as educational pedagogy for adults, androgogy draws on the principles of constructivism and the principle that adult learning needs to focus on the process of learning. Knowles (1990) suggests that adult learners need to know

why they must learn and that they are self-motivated and able to accept responsibility for learning. Knowles also acknowledged the need to recognise that adult learners have a variety of experiences that can provide a rich resource for learning and that the experiences may be imbued with personal bias. The discussion forum enables adult learners to take responsibility for their learning, share experiences and build knowledge based on what they already know.

## **FACTORS AFFECTING THE BEHAVIOUR OF DISCUSSION FORUM PARTICIPATION**

Participants in discussion forums often appear to duplicate the behaviours exhibited by learners participating in a face-to-face group discussion (Meyer, 2003). Confident and extraverted learners are happy to contribute towards active discussion while shy and introverted students are reticent to communicate and do so sparingly. One of the most significant differences between face to face and discussion forum debate is the absence of body language clues which indicate a learner's reaction to comments made by fellow learners. These visual clues often have the affect of promoting or stifling active learner participation. When a learner receives a positive response in the form of positive body language clue, the learner is more likely to become more actively involved and gain the learning benefits that active participation offers. In the same way a negative response will reduce the likelihood of continued participation.

Nonnecke & Preece (2001) describe the results of a study conducted to help identify why many learners elect not to actively participate in discussion forums. Reasons given for zero or low level contribution include shyness, anxiety, poor writing skills, lack of confidence in the topic being discussed, lack of time, information overload and poor motivation.

Careful management of discussion forums can help reduce many of the factors identified by Nonnecke and Preece (2001) as contributing to poor discussion contribution. They suggest that shy participants are more likely to contribute if they can remain anonymous. While there has been much debate on the value of awarding grades for participation, evidence suggests that motivating participation by allocating grades significantly increases learner contribution and activity (Campbell, 2002). Encouragement by way of responding positively to novice posters, will help reduce anxiety and promote further activity (Nonnecke & Preece, 2001). Similarly, judicious instructor intervention, can help defuse heated debate when required and promote discussion when activity between participants wanes (Campbell, 2002).

## MEASUREMENT OF COLLABORATIVE ACTIVITIES

A review of literature suggests that discussion forums do much to enhance the experience of learners participating in e-learning. Studies have been conducted to evaluate the level of participation and to measure quality of discussion between learners (Hiltz (1990), Mason (1991) Henri (1992), Gunawardena, Lowe and Anderson (1997)). These studies relied on manual coding of activities to gather data relating to student activity, a time consuming and often tedious process. The results of the studies allowed observations to be made about social interaction between learners, the levels of participation and the collaborative activity between learners.

In terms of participation in discussion forums, quality of participation is more important than quantity (Hiltz, 1990). One of the more generally accepted methods of measuring the quality of responses in an asynchronous text based discussion forum is the process of content analysis. The view, that that the quality of the learning process could be measured by analysing the transcripts of asynchronous text based communications, is supported by Hiltz (1990) and Mason (1991). Henri (1992) took this one step further when he suggested breaking transcripts into critical thinking units and classifying these into categories, which could be measured. Gunawardena, Lowe and Anderson (1997) took the ideas of Henri and integrated a participation component, and developed a five-phase Interaction Analysis Model. The model classified messages into one of five phases:

1. Sharing/Comparing Knowledge
2. Discover/Explore disagreements
3. Synthesis via negotiating meaning
4. Testing/modifying proposed synthesis vs. schemas, theory, facts, beliefs
5. Proofs of reaching agreements or meta-cognitive admitting change of knowledge.

Devine (2002) used the Interaction Analysis model as the basis for developing a set of instructions for students participating in discussion forums. The instructions clearly identify what is expected in terms of quality:

"Your postings should advance the group's negotiation of ideas and meanings about the material; that is, your contributions should go beyond a "ditto." Some ways you can further the discussion include:

- expressing opinions or observations. These should be offered in-depth and supported by more than personal opinion.
- making a connection between the current discussion and previous discussions, a personal experience, or concepts from the readings,
- commenting on or asking for clarification of another student's statement,

- synthesizing other students' responses, or posing a substantive question aimed at furthering the group's understanding."

Like the Interaction Analysis model, Devine has identified a list of activities that could be categorised and graded to rate the activity of forum participants.

Evaluation of these models would suggest that they appear to be based around measuring activities that can be found within Bloom's Taxonomy of Learning. Bloom (1956) headed a group of educational psychologists who developed a classification of intellectual behaviours considered to be important in the learning process. The cognitive behaviours were categorised into six categories, starting with the simplest and moving to the more complex. The six categories and brief descriptions of associated activities as described by Lane (2002) are listed below:

- Knowledge: remembering previously learned materials, demonstrated by recognising, recalling, reproducing materials.
- Comprehension: the ability to grasp the meaning of material, demonstrated by classifying, describing, explaining and reviewing materials.
- Application: the ability to use learned materials in new situations, demonstrated by applying, selecting, illustrating and articulating ideas.
- Analysis: the ability to break down materials into its component parts so that its structure can be understood, demonstrated by analysing, appraising, contrasting and categorising ideas and concepts.
- Synthesis: the ability to put parts together to form a new whole, demonstrated by assembling, constructing, creating and designing.
- Evaluation: the ability to judge the value of material for a given purpose, demonstrated by appraising, arguing, assessing, judging and rating concepts and ideas.

The taxonomy model could be applied directly to measure the sophistication of postings made by learners as they participate in discussion forum activity. Transcript analysis against each of the categories would enable data to be gathered that could be used to indicate the quality of learner participation.

While there are sophisticated active teacher agents, such as NUD\*IST and Hyperqual, that can automatically scan text for spelling and grammatical errors, software tools have not yet been developed that can measure things like depth of discussion, personal opinion or ability to synthesise another participant's responses. This task continues to be done by manually evaluating individual contributions and rating them in terms of how they rate against a set of specified criteria.

## THE MODEL

Having reviewed the literature relating to the use of discussion forums and their value in terms of educational pedagogy, the writer attempted to investigate how discussion forum software could be enhanced to automate the collection of data relating to learner activity.

Defining what to measure and how to determine collaborative activities within a discussion forum proved to be an interesting task. Data related to learner activity in terms of time spent online, number of postings read, and the number of topics and postings created are relatively easy to capture. The same cannot be said for attempting to capture statistics related to the quality of the topics and postings created.

Many of the software systems used to manage discussion forums allow the collection of basic user statistics. Most systems can identify the number of postings made by individuals and can display responses to postings made by individuals. Because most discussion forums allow anonymous read access they are unable to track the activities of participants who choose to observe the postings of fellow learners and who elect not to participate in the posting process. These non-posting participants are often referred to as “lurkers” or read only participants known as “ropers”. They may regularly visit a forum to monitor discussion and tracking their activity may provide a better picture of learner interaction and activity. Few systems track the time spent by participants undertaking reading, posting and responding activities, and fewer still are able to measure the quality of learner postings.

With the limitations of current discussion systems in mind, the writer undertook the design of a model to collect statistical data that could be used to accurately measure all student activity, including the passive behaviours of lurkers. During the design process the goal was to develop a model that would assist instructors to measure the activities of all course participants. This included the activities of lurkers, and as such the model design dictated that viewing anything more than topic headings would require a participant to login using an identifier and password. To allow learners to maintain anonymity between participants, each learner will be assigned a nickname and password known only by the course instructor.

Figure 1: Entry screen requiring users to login

The model has been designed to track all participant activities, including viewing postings, tracking threads, creating topics for discussion and posting responses to existing topics. As a participant logs onto the system, the time spent on a particular activity is recorded, allowing quantitative data to be gathered so that it can be analysed at a later time. The system allows weightings to be applied to each of the activities that can be tracked. An instructor can weight each activity from zero,



which means the activity is ignored in calculations, to five, which is the maximum weighting that can be applied to an activity.

Figure 2: Weighting activity screen

The model also provides administrative functions available only to authorised instructors. These functions allow an instructor to view the postings of all individuals categorise activities and weight the content of each posting using a five point scale against set of criteria identified within Bloom's taxonomy of learning and similar to those used by Gunawardena and Devine.

Figure 3: Quality weighting screen

When completed the model should allow a detailed picture of each participant to be collected, and should allow comparisons to be drawn between participant activities and the quality of participation calculated on the basis of scores allocated by the instructor using the administrative functions of the model.

Compared to existing activity measuring tools, the model provides added functionality in terms of recording measurement of quality and integrates these with the quantitative activity measures. The model should reduce the time taken to rate activities and allow automatic comparisons of activity level and quality of interaction to be made between participants.

## **FUTURE ACTIVITIES**

Currently the model is only in a conceptual phase and requires significant development before it could be used to monitor discussion forum activity and gather data. The writer intends to conduct further research into the area of content analysis to further define what constitutes quality when evaluating a discussion forum participant's responses.

The administrative tutor component of the model has the potential to be extended to include measurements based on the social network analysis model described by Scott (2001) and the positional analysis model proposed by Lipponen et al (2001).

Once the design of the model nears completion, the goal is to produce a discussion forum system based on the model, and use it to manage discussion forum activities for tertiary level information system courses. The data collected from the system will then be analysed to identify if relationships exist between the data produced by the activity tracking component and the tutor assigned ratings, which awards scores for collaborative aspects and quality of participation.

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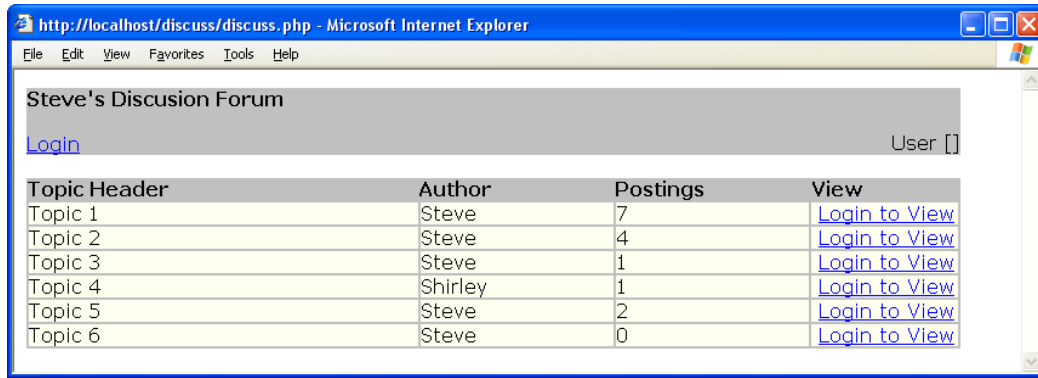


Figure 1: Entry screen requiring users to login

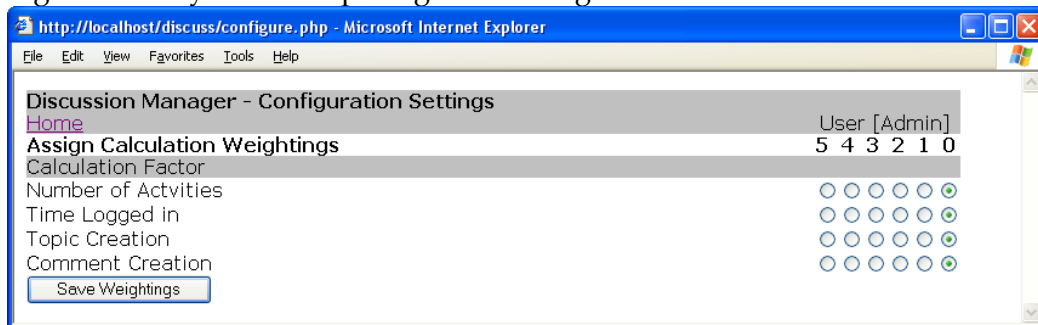


Figure 2: Weighting activity screen

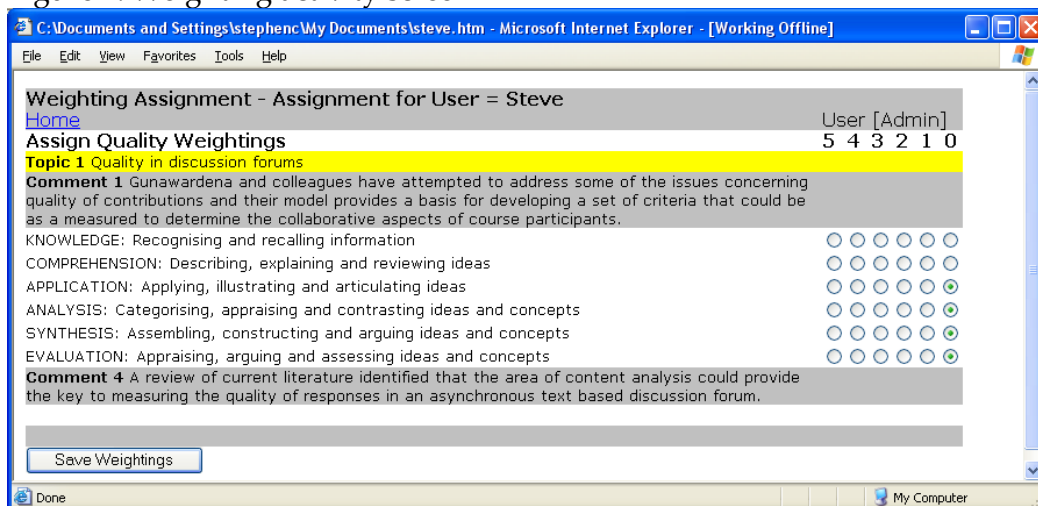


Figure 3: Quality weighting screen