Asynchronous Discussion Forums: Success Factors, Outcomes, Assessments, and Limitations.

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Martin A Andresen
Simon Fraser University
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Asynchronous discussion forums: success factors, outcomes, assessments, and limitations

Martin A. Andresen
School of Criminology, Simon Fraser University, 8888 University Drive, Burnaby, BC V5A 1S6 Canada // Tel: 778 782 7628 // Fax: 778 782 4140 // andresen@sfu.ca

ABSTRACT

Online learning has been burgeoning over the past decade with one of the more popular modes of conducting online learning being the asynchronous online courses. Within the asynchronous online course, the asynchronous discussion forum replaces the face-to-face interaction of the traditional classroom, but is this form of discussion able to enhance the learning process? This paper reviews the literature regarding asynchronous discussion forums finding that that the asynchronous discussion forum is able to generate the critical dimensions of learning found in the traditional classroom, but it has its limitations.

Keywords

Asynchronous discussion forums, On-line learning

Introduction

The process of discussions is a critical dimension of the learning process. Moreover, the learning experience itself has been shown to be enhanced through the regular participation in discussions (Kolb, 1984). Whether these discussions take place in a traditional classroom or through online teaching using electronic means, their importance is integral to both learner achievement and learner satisfaction (Fulford and Zhang, 1993; Zhang and Fulford, 1994). Because of the development of faster computers, improved telecommunications networks, and the development of readily accessible software the availability of courses and programs through online teaching has been growing exponentially.

Regarding the growth of offerings in online education, Tucker (1995) found that the percentage of colleges and universities in the United States offering online education went from 3 – 30 percent, 1990 – 1995; and Gubernick and Ebeling (1997) found that the number of institutions in the United States offering online education increased from 93 to 800, 1993 – 1997. No doubt, in more recent years, the growth continues to be exponential, not only in the scale, in terms of how many colleges and universities are offering some form of online education, but in the scope of courses and programs that are available in each of those institutions.

In a more recent study funded by the National Center for Education Statistics that investigated the 2000 – 2001 academic year, Waits and Lewis (2003) found that 90 percent of public post-secondary institutions in the United States offered distance education, with 90 percent of those institutions undertaking asynchronous online courses. These numbers led to more than 3 million learners (82 percent undergraduates) being enrolled in almost 120 000 credit-granting courses (76 percent undergraduate) that year—over 127 000 courses if one considered non-credit courses (Waits and Lewis, 2003). Additionally, and important for this review, of those institutions that would offer or planned to offer distance education within the next three years, 80 percent stated that they would increase or start using asynchronous online education as the primary mode of dealing with those courses. Though no study was found that measured online education in Canada, similar percentages are expected. As such, understanding the nature of asynchronous online education is critical because of its widespread use and expected expansion; in particular, it is important to understand the determinants of effective learning in an asynchronous online discussion because these discussions are the equivalent to the face-to-face discussions common in the traditional classroom that Kolb (1984) found to be critical in the learning process.

There are some obstacles to overcome that are specific to an asynchronous online discussion and, hence, its learning process. All distance education, whether online or not, is defined by having the instructor and learner separated in space (Mood, 1995); with the added dimension of an asynchronous discussion, they are also separated by time (Carswell and Venkatesh, 2002)—of course, it is possible that multiple learners and the instructor may be online at the same time enabling an asynchronous discussion to occur very close to "real time". Consequently, the asynchronous discussion forum must be specifically analyzed in order to enable the asynchronous discussion to be as

(or more) effective as the traditional face-to-face-discussion if high levels of learning are to take place—some of the benefits of the asynchronous discussion that may make it more effective than the traditional face-to-face discussion are that it allows those people who need more time to participate to contribute to a discussion, a discussion participant cannot be "cut off", and there is a transcript of the discussion for study purposes after the discussion takes place.

Despite this need for analysis of the asynchronous discussion forum, the literature is growing, but relatively small and spread across a wide array of disciplines ranging from education to physics to philosophy. In this literature review, I cover the research areas that I consider the most important: the makings of a successful asynchronous discussion, assessing asynchronous discussion forums, and the limitations of asynchronous teaching. These sections are then followed by conclusions and directions for future research.

The Components of a Successful Asynchronous Discussion

Making a successful asynchronous discussion is probably the most important aspect for an instructor to consider. Though assessment and the limitations of these discussions are also important (see below), if one is truly concerned about the generation of knowledge in learners the asynchronous discussion itself is key. Two components in the literature emerged as being particularly important for a successful asynchronous discussion forum: the role of the instructor and achieving deeper/higher learning. Each is discussed in turn.

The Role of the Instructor

Instructing in an online environment is inherently different from the conventional classroom. Therefore, we should expect that the roles that we take on as instructors will change, to some degree, when we deliver an online course and monitor an asynchronous versus a live discussion. Coppola et al. (2002) investigate this change through interviews of twenty faculty and found that instructor roles in cognitive, affective, and managerial activities changed in the online environment.

First, the relationship between the instructor and the learner (affective role) needed to change because of the loss of face-to-face contact in the conventional classroom. Instructors needed to find new ways to express emotion, or passion for the subject matter, when communicating ideas to the learners. As a consequence of this search for new modes of communication, the instructors felt that the virtual classroom, including the asynchronous discussion forum, became more intimate. Second, as a result of instructors searching for new modes of communication, instructors found that their teaching involved deeper cognitive complexity (cognitive role). Tone of voice, body language, and spontaneous questions to clarify concepts are all lost in an asynchronous learning environment necessitating the instructor to become much more cognitively involved in the learning materials. And lastly, the managerial role changed through differences in class and course management. Again because of that loss of expressiveness and spontaneous questions in the face-to-face classroom, instructors need to pay more attention to the details within the course: more precision and formality in setting assignment expectations, for example. Clearly, knowing that successful teaching in an online environment necessarily involves changing your role as an instructor in multiple dimensions is important information, but other research has found specific details of what instructors need to do in order to have that success.

Simply forming an asynchronous discussion forum, providing the technology, and a question or topic of discussion is not enough to ensure success in an asynchronous discussion (Guldberg and Pilkington, 2007). Though there are always factors beyond the control of the instructor such as the personalities of the learners enrolled in the asynchronous discussion forum and how they chose to interact with other learners (Guldberg and Pilkington, 2006), there are two questions that emerge and need to be considered: first, and related to the managerial role referred to by Coppola et al. (2002), what does the instructor need to do in order to stimulate good asynchronous discussions and, second, once that discussion is underway how much should the instructor intervene?

Factors that are within the control of the instructor and have positive effects with the generation of complex discussion are the time learners have to prepare for a discussion, the time needed to develop online relationships within the asynchronous discussion forum, and the nature of the discussion (McConnell, 1994; Salmon, 2002). More

specifically, Dysthe (2002) has found that learners should have a reading assigned to them, have time to reflect on that reading as well as a discussion topic or question, and then present examples (real or hypothetical) that relate to the topic or question to the other learners and defend those examples in the discussion. Moreover, successful questions or discussion topics must be related to the learning objectives with clarity in due dates, expectations, and the weighting of grades so that learning objectives may become learning outcomes (Guldberg and Pilkington, 2007; Majeski and Stover, 2007). And as found by Fung (2004), when discussion questions or topics were specific and related to a concept or idea within the course readings the discussions were more successful in generating complex interaction between learners than those discussions that were begun with open-ended and broad questions. For example, asking a learner what to *do* in a situation rather than what they *thought* of a situation generated complex interaction.

With regard to the timing of the discussions, time to prepare for a particular discussion is only one of the important temporal considerations needed to be considered by the instructor. Rather than beginning the course discussions with deep cognitive questions and topics, questions and topics that encourage discussions on social, personal, and reflective levels should be used in the beginning discussions in a course. This strategy is used to initiate discussion between learners in order to develop online relationships. Only once these online relationships have been developed should cognitive questions and topics be gradually introduced to the learners (Salmon, 2000).

Equally important to the design of the asynchronous discussion forums is the level of intervention taken on by the instructor. The research on this dimension of the asynchronous discussion forum is quit clear for the instructor when considering the learning outcomes of the learners: back off. In a study that asks the question of what role an instructor should undertake in an asynchronous discussion forum (sage, guide, or ghost), Mazzolini and Maddison (2003) found that it depends on what the instructor wishes to accomplish. Learner ratings of a course will show that an instructor is more enthusiastic and expert if s/he increases his/her postings. Similarly, Swan and Shih (2005) find that the *perceived* presence of an instructor is more important than the perceived presence of peers in student satisfaction. However, an instructor that contributes significantly to a discussion tends to decrease the length of discussions (this does not necessarily decrease the quality of the discussion, however) as well as their frequency. What appears to be occurring in this situation is that the instructor can decrease learner – learner interaction because the learners begin to rely on the instructor to answer questions, becoming the export or sage to "settle" debates (Guldberg and Pilkington, 2007; Paloff and Pratt, 2001).

Rather, the instructor should intervene, but only in order to keep the discussion on track, or take on a cheerleading role to motivate the discussion (Dysthe, 2002; Paloff and Pratt, 1999). The role of a cheerleader or motivator is critical because it is the learner-learner interaction that truly engages with ideas and relates back to Kolb's (1984) statements that discussion is a critical component of the learning process, not waiting for the answers to fall from Heaven's academic prophet. Preferably, the instructor should spend his/her time preparing materials and the carefully thought out discussion questions and topics that relate to learning objectives, as discussed above.

Achieving Deeper/High Learning

The ultimate goal of spending the time to develop an asynchronous discussion forum, and manage it in the appropriate manner, is to create an online learning environment that will achieve high levels of learning. One way to assess whether or not this has occurred is to test the level of learning that has been reaching within the discussion using an appropriate methodology.

The earliest study found that investigates the level of learning is Webb et al. (2004). This study is not concerned specifically with the dialogue (quantity and quality) that occurs within the asynchronous discussion forum, but the learning outcomes measured by learners' grades for the course. Webb et al. (2004) finds that as participation in the asynchronous discussion forums (measured by access to the discussion forum and the number of postings) increases so do the measured grades for the learners. The limitation with this finding is that it does not consider the degree of cognitive engagement in the asynchronous discussion forums. If a higher degree of cognitive engagement is achieved then perhaps all learners will extract a greater benefit from the asynchronous discussion.

Using a number of different models of hierarchical learning, Schellens and Valcke (2005; 2006) measured the degree to which asynchronous discussion forums reached the higher levels of knowledge creation. They found that

asynchronous (versus synchronous) discussion forums attained a higher proportion of higher phases of knowledge creation. This occurred because the vast majority of communication in the asynchronous environment was task-oriented, greater than 88 percent (Schellens and Valcke, 2006). Additionally, they found that groups with more discussion resulted in higher level of knowledge construction (Schellens and Valcke, 2005), as well as smaller asynchronous discussion groups ($n \leq 14$) resulted in higher levels of task-oriented communication and, hence, a higher proportion of higher phases of knowledge creation (Schellens and Valcke, 2006). This last finding is important for the original development of courses and their corresponding asynchronous discussion forums. Though some instructors may fear their job security is at stake with the advent of online education, this research clearly shows there are limitations that should be put in place on class and discussion sizes for reasons of pedagogy.

Lastly, and related to the previous subsection, Zhu (2006) has found that high levels of interconnectedness between learners leading to higher levels of knowledge construction must be explicitly built into the discussion assignment and nurtured by the instructor. More specifically, the instructor's discussion design is more important that any specific technology used for the asynchronous discussion forum. Knowledge construction only occurs because of careful planning: clear, well-defined, well-crafted questions and discussion topics. Without such planning and subsequent guidance, only lower levels of cognitive engagement will occur. As noted by Howell-Richardson and Mellar (1996), the level of interaction between learner and, hence, their cognitive engagement, may be increased with only slight modifications to the course design and the instructor's behavior.

Assessing Asynchronous Discussion Forums

Given the importance of the discussion in the learning process at both the theoretical and empirical level, an appropriate measure of participation should be a component of each learner's grade for the course. Though there are always learners who wish to participate in discussions, face-to-face or online, many learners need an *incentive* to participate in class discussions. As such, just as it is critical for the instructor to set out each task in an asynchronous discussion forum clearly and succinctly (see above) so must be the assessment of those asynchronous discussion forums in order to facilitate as much discussion as possible between the learners.

The primary difficulty in making any assessment of an asynchronous discussion forum is the huge volume of data that are available to be assessed—content analysis has been shown to be useful in a small class setting (Bali and Ramadan, 2007). Within this vast amount of data, learners decide where to post their comments, making the discussion not follow the temporal sequence of the postings—for example, if there are five postings within one discussion forum, a learner may respond to the second posting after having read all five of the postings (Dringus and Ellis, 2005). Consequently, discussions appear to the reader as fragmented and discontinuous because of this temporal separation of postings making assessment complicated. As a result, there is no one accepted method for assessing learner participation in asynchronous discussion forums.

However, this is not to say that there are no options. Roblyer and Wiencke (2003) provide an assessment rubic for such a learning environment, but this rubic is far too complex to analyze even a small number of long asynchronous discussion forums. Alternatively, and particularly relevant for large number of asynchronous discussion forums, the frequency of logging on to the online environment and the length of time spent in the online environment may be used as an assessment tool that is readily and easily available within many of the online systems (see, for example, Ahern and Durrington, 1996; Taraban et al., 1999). However, the quality of time spent in the online environment is a just as important a consideration in order to assess participation in asynchronous discussion forums (Dringus and Ellis, 2005)—one may simply log in multiple times a day while playing computer games and chatting with friends online. It is very possible for a learner to have a great influence on the quality of a discussion from short participation times within the online learning environment; rather than spending all of his/her time staring at the computer screen, s/he may read the discussion, log off, think of the issue, and then quickly log on to post a response. As a result, the whole (the actual contribution of an individual learner) may in fact be greater than the sum of its parts (the apparently short log in times and postings).

The challenge, then, is to measure the quality of a learner's contribution to an asynchronous discussion forum. Dringus and Ellis (2005) suggest that instructors need to know the following: when a learner posts in the asynchronous discussion forum relative to the assignment time frame, whether or not these postings are responses, if they are responses were they immediate, and whether or not a learner's postings generate responses from other

learners. Gathering this type of information, however, is difficult and time consuming if performed manually. Herein lays the need to generate methods of assessment for asynchronous discussion forums that can apply more complex assessment rubics (see Roblyer and Wiencke (2003) from within the online system itself rather than relying on manual interpretation of the discussions (Garrison et al., 2001; Jarvela and Hakkinen, 2003)).

One method of assessment for asynchronous discussions that has been proposed recently is the use of data mining. Data mining literally analyses large volume databases in order to extract any relationships, clusters, and/or patterns to the data (Dringus and Ellis, 2005; Romero and Ventura, 2007). Even simple data mining procedures can generate valuable information regarding such factors as: the number of learner postings within a particular time span, whether or not a learner initiates discussions and/or responds, and how long it takes a learner to respond to an initial posting (Dringus and Ellis, 2005). This information may be used as the entire assessment of a learner's participation in the asynchronous discussion forum or as a component of that assessment; alternatively, this information may be used to see if it is worth the time to further analyze actual transcripts of a learner's participation.

The difficulty with employing data mining methods in asynchronous discussion forum evaluation (or any evaluation for that matter) is that currently data mining tools are too complex for those not trained in computer science (Romero and Ventura, 2007). Consequently, there is a need for collaborative efforts between computer scientists, educators (which includes computer scientists, of course), and the providers of the technology for online education in order to develop data mining tools within the educational technology that can be used by the average user with minimal, or no, training. This relationship can also become symbiotic and dynamic in the sense that an initial assessment rubic can be developed with the current constraints of data mining in the asynchronous discussion forum context. In time, armed with a "wish-list" from those teaching in an asynchronous environment, computer scientists can develop more/better data mining tools to be implemented into the online teaching technology.

The Limitations of Asynchronous Teaching?

Despite the fact that there are clear methods for establishing, moderating, and maintaining successful asynchronous discussion forums have been outlined above, as well as a move toward methods of assessing those asynchronous discussion forums in a more meaningful way, one may still ask whether there are limits to the use of asynchronous discussion forums in education. Surely no one will argue that the lecture hall has limits: it is not conducive to class discussions; and similarly, the tutorial classroom (with only desks, tables, and chairs) is not a suitable environment for the lab component of a chemistry class. Then what limitations, if any, are there for the asynchronous discussion forum?

There appears to be very little research on the limits of asynchronous discussion forums, but the research that is available is consistent, at least when it comes to the type of discussions that are feasible in an asynchronous learning environment. Though in general the sciences have issues regarding the feasibility of asynchronous discussion forums (Larreamendy-Joerns and Leinhardt, 2006), two studies have emerged that are consistent in showing that problem-based learning is difficult in an asynchronous discussion forum. Kortemeyer (2006) found in an introductory physics course that conceptual issues relating to physics education work well within an asynchronous discussion forum: discussing new terms, concepts, etc. However, when it came actual problem solving (usually mathematics), critical in much of the sciences, the asynchronous discussion forum was not successful—a similar result was found by Hong et al. (2003) regarding problem solving in an asynchronous discussion forum in a statistics class.

Though some learners that complain about participating in asynchronous discussion forums simply prefer to work alone rather than in groups (see Oliver and Omari, 2001), there are reasons why problem-solving discussions are difficult in an asynchronous environment. The discussion of concepts and ideas, though needing to be focused, are able to waver, whereas discussions regarding problem-solving tend to be extremely specific: what am I missing in order to solve this equation? In other words, posting a question or response regarding a concept, and waiting for someone to reply, is much different than waiting for someone to reply to your call for aid in solving a problem—one has a very specific desired end and the other does not, necessarily. Consequently, instructors need to be aware not only of the specifics, deadlines, and weighting of an asynchronous discussion question or topic, but whether or not that type of topic or question is appropriate in an asynchronous environment.

In a completely different type of course, multicultural education, Merryfield (2001) came across a paradox in her asynchronous discussion forums. One the one hand, the participants in an asynchronous discussion were found to be far more reflective, frank, and willing to discuss sensitive multicultural issues regarding topics such as racism, white privilege, and homophobia than similar discussions in her face-to-face version of the same course. Merryfield (2001) believed this to be because the learners did not have to look the other people in the eye, which allowed them to speak more freely. But despite the deeper and more engaging asynchronous discussions, as opposed to Merryfield's (2001) traditional face-to-face classroom experience, most of the learners in this course felt that the asynchronous discussion forum was a less meaningful form of communication. Learners felt disconnected from the discussions and were left wondering if the experience was actually real.

This is indeed a strange finding because, as discussed above, more engaged discussions generally do not emerge until online relationships are established (Salmon, 2000). But if these online relationships were established in Merryfield's (2001) course in order to have these more engaged discussions, what then is the definition of an online relationship? As noted by Hillman et al. (1994), all interactions in an online learning environment (including the asynchronous discussion forum) are mediated through technology. Consequently, a question that needs to be answered is: what is the nature of the online relationship and does it limit the scope of the use of the asynchronous discussion forum in online educational environments? Though this question cannot be answered here, Shea et al. (2005) suggests that the instructor's role is of the most promising mechanisms to establish online learning relationships. This harks back to the earlier statement that instructors need to spend time preparing the asynchronous discussions rather than being active within them.

Conclusions and Directions for Future Research

Online education has experienced a vast expansion in the creation of its environments, including both the current and expected use of asynchronous online courses and their corresponding discussion forums. The research on the asynchronous discussion forum presented here has shown both consistent results in what needs to be done for their present success (what makes a successful asynchronous discussion forum) as well as what needs to be done for their continued success (the assessment of asynchronous discussion forums and their limitations).

It is clear that asynchronous discussion forums can achieve high levels of learning, but people in decision-making positions must be aware of the conditions for this to occur. Asynchronous online courses are not a method of displacing instructors. In fact, because of the nature of successful asynchronous discussion forums, asynchronous online courses need to be as instructor intensive (instructor to learner ratio) as the traditional classroom. And in some cases, namely problem-based learning, the asynchronous discussion forum does not appear to be appropriate. In other words, there is no one size fits all application of asynchronous online learning. Consequently, asynchronous discussion forums may form part of a more generalized model of learning—a blended learning approach.

Though some of the early research on asynchronous learning environments, including the asynchronous discussion forums, has been accused of lacking in both quantity and quality (see Wegner et al., 1999, Kyounghee Lim, 2001), this is clearly no longer the case, particularly for the quality of research. Though the research on the nature of a successful asynchronous discussion forum appears to be quite clear at this time, there are, however, avenues of research that do need to be pursued or elaborated in regard to the assessment of the asynchronous discussion forum and its limits.

As indicated above, the assessment of asynchronous discussion forums is a large undertaking when the discussions are of a significant length and/or number and there are a lot of learners involved in the discussion itself. Data mining definitely provides a fruitful method of assessment that can evolve through the collaboration of educators and computer scientists; as data mining techniques improve and respond to educators hopes for assessment, so does the ability of educators to design and implement asynchronous discussion forums that are conducive to the learning process and can also be assessed with relative ease. The difficulty is in the user-friendly nature of these tools. Clearly, these tools need to be integrated into the online teaching technology in order for them to be adopted en masse. Future research in this area needs to investigate the ability of new data mining tools to be incorporated into the technology of online education while at the same time being sensitive to availability: not just the relatively large corporations such as Blackboard and WebCT, that recently merged, but also the smaller, free, and open-source course management systems such as Moodle.

On a related note, the availability of free management systems such as Moodle may be critical in assessing benefits to costs for the practicality of delivering asynchronous online learning. However, one must be careful as this is a limited view of online learning. The tuition collected for asynchronous online learning may cover the operational costs justifying the existence of an online instructional department, but is the value of the outcomes justified by the cost? In other words, is the *value* of an online learning program worth the cost of delivery? This topic is another direction of future research.

With regard to the limitations of the asynchronous discussion forum, one future research direction has already been posed above: an investigation of the nature of the online relationship. However, the physics and statistics examples above also point to the need for research on setting the boundaries of online education based on pedagogical grounds—the community of inquiry model may provide considerable guidance here (Garrison et al., 2000; Garrison et al., 1999). No medium or method can be all things to all people and to all course material so the educational community needs to be aware of when and where to stop the development of asynchronous discussion forums specifically, and online education, generally.

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