Chapter 1
Introduction

1.1 Introduction

In the traditional learning paradigm, the notion of schooling primarily hinges on the idea of transmitting a certain knowledge base to individual learners (Roehler and Cantlon 1997). Under this educational paradigm, the main task of an instructor was to provide learners with knowledge, while the learners' goal was to learn by individually digesting and organizing the information received (Hsu et al. 2000). Learning is assumed to have occurred when the individuals are able to recall the knowledge presented by the instructor (Hsu et al. 2000).

However, contemporary discussions of education in the recent years are increasingly emphasizing the social nature of learning, or the social constructivist paradigm (Palincsar and Herrenkohl 2002). This does not mean that traditional learning is no longer relevant or useful but that during social learning, the interaction or discussion among students could generate extra activities (e.g., explanation, disagreement) as well as additional cognitive mechanisms (e.g., knowledge elicitation and sharing) which may not occur as frequently in traditional, individual learning (Dillenbourg 1999). So concomitant with an increased interest in the role of interaction in academic engagement and learning, and inspired by the growing body of scholarly work (e.g., Brown and Campione 1994; Brown and Duguid 2000; Resnick et al. 1991; Ruhleder et al. 1996; Vygotsky 1978), educators today are particularly interested in fostering learning environments that provide opportunities for learners to exchange ideas with one another. An example of this would be collaborative learning (van Drie et al. 2005).

Collaborative learning emphasizes the negotiation of meaning or ideas among participants pertaining to the specific task at hand (Dillenbourg 1999; Palincsar and Herrenkohl 2002; Roschelle 1992; Roschelle and Teasley 1995; Stahl et al. 2006). Negotiation of meaning or ideas includes exploring dissonance among ideas or concepts, and suggesting areas of agreement where conflict exists in order to establish a shared understanding (Gunawardena et al. 1997). Through the process of negotiating meaning, participants could broaden their own understanding and

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perspective, which is then individually reconstructed into their own long-term memory catalyzed by the individual's prior knowledge and experience (Wu 2003).

1.2 The Role of Discussion

Central to the idea of collaborative learning is the notion of discussion. A discussion provides a platform for students to exchange opinions, share multiple perspectives, and clarify various thoughts (Dunlap 2005). Discussions can also help students increase their awareness and tolerance towards ambiguity, and also help them to appreciate diversity more (Brookfield and Preskill 2005). Student discussion has been identified as one of the activities that students found most beneficial to their learning (Ertmer et al. 2007; Richardson and Swan 2003). Traditionally, discussion occurs in face-to-face learning environments such as a classroom or a laboratory. Such face-to-face classroom discussions, however, are typically limited by several factors.

First, face-to-face classroom discussion usually involves instructor–student interaction, characterized by the Initiate-Respond-Evaluate (IRE) structure (Ng 2011). In IRE interactions, the instructor typically initiates a topic with a question, followed by the students answering the question, and finally an evaluative response (e.g., correct or wrong feedback) from the instructor. The number of questions student ask in face-to-face classroom settings is low (Graesser and Person 1994). Students may not have many opportunities to interact with one another in an IRE-enabled class (Almasi 1996).

Second, face-to-face classroom discussion is limited by the school time-tabling structure. For example, Becker (2000), in a survey of more than 4,000 teachers in over 1,100 schools in the United States found that most secondary students have a continuous block of less than one hour's duration to do work in any one class. The imposition of a time table structure limits the amount of discussion students can have in a class. Although students may continue their discussion outside class time, it is difficult, if not impossible, to get everyone to stay back after school on a regular basis (Lim et al. 2011).

Third, face-to-face classroom discussions are usually dominated by a few students. These students are typically the more knowledgeable, or outspoken ones. In addition, some students feel uncomfortable as they find it difficult to keep up in terms of contributing in a fast-paced face-to-face discussion. Often, by the time they think of a response to a question, another student has already answered, or the discussion has moved on to other topics (Rollag 2010). In this way, students who are shy, quiet, or those who need more time to think before answering, often end up taking the backseat in face-to-face discussions.

The use of computer-mediated communication (CMC) tools may help overcome these limitations. CMC tools enable students to continue their discussion outside their class time, as well as provide opportunities for quiet or shy students to voice their opinions. CMC tools also allow students to have more control over the

discussion, as compared to face-to-face discussions which may be dominated by their instructors (Althaus 1997; Jones et al. 2006; Salmon 2004). Despite the many different types of CMC tools, they can be broadly grouped under either the synchronous or asynchronous discussion categories. Synchronous discussion tools such as Microsoft Network (MSN) chat require students to simultaneously log on to the platform in order to interact with one another. Asynchronous communication, on the other hand, does not require students to log on at the same time to communicate with one another.

1.3 Asynchronous Online Discussion

Just what exactly is asynchronous online discussion? The main defining characteristic of an asynchronous online discussion is that the discourse that takes place within it is not real time. This time independent nature of asynchronous online discussion makes it particularly well received by many educators (Hew et al. 2010b; Romiszowski and Mason 2004). Individuals can view the messages many times and long after the messages have been posted and respond to the messages posted at any time they prefer. According to Kearsley (2000), asynchronous online discussion is the second most commonly used capability for online teaching and learning after email. There are currently many software packages that offer platforms for asynchronous online discussions. These include *BlackBoard*, an integrated online delivery and management system for faculty members and students to use, as well as *Yahoo Group, Google Group,* and *Knowledge Forum*, among others.

Unlike synchronous chats, notes or messages posted in an asynchronous online discussion are usually threaded. A discussion thread is a series of messages that have been posted as replies to one another, in a chain. By reading each message in order, a participant or facilitator can follow the conversation easily as it progresses. A single simple discussion thread may remain a straight line or turn into a tree as participants post follow-up messages to replies. The visual display of the threads allows participants to easily view the desired message and post their replies. Figure 1.1 provides a prototypical illustration of possible discussion threads. In Fig. 1.1, Subtopic 1 is an example of a discussion thread. Another example is Subtopic 2.

1.3.1 Potential Benefits of Asynchronous Online Discussion

A review of the literature shows several reasons for the widespread use of asynchronous online discussion in education contexts. Perhaps, the greatest advantage of using asynchronous online discussion is that it allows students to participate in the discussion at a pace that they are comfortable with. The benefit of being able to

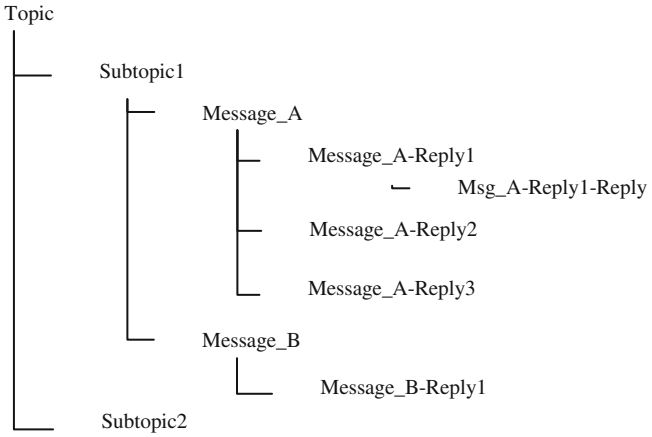

Fig. 1.1 A prototypical illustration of discussion threads

contribute to the discussion at one's own pace is that it gives students ample time to respond to other students' comments (Murphy and Coleman 2004). Such time-delayed interaction could help students develop thinking skills, and solve ill-structured problems (Hew and Knapczyk 2007).

Additionally, all asynchronous online discussion environments require participants to reify or explicitly express what is on their mind (e.g., ideas) as concrete thoughts (e.g., messages) in a forum. These ideas can then be worked on and improved through acts of social interaction, such as questioning, clarifying, or elaborating. Asynchronous online discussion has been referred to as a powerful tool for collaborative learning that "promotes a level of reflective interaction often lacking in a face-to-face, teacher centered classroom" (Rovai and Jordan 2004, p. 3). Some researchers also suggest that the very process of expression could help participants to construct their thoughts more carefully (Vonderwell 2003), and also hone higher level learning skills such as analysis, synthesis, and evaluation (Newman et al. 1997).

There are many ways in which instructors and students could use asynchronous online discussion in actual teaching and learning practice. In the following section, we provide a model of how asynchronous online discussion can be integrated into a course.

1.3.2 An Example of How Asynchronous Online Discussion Could be Integrated into Teaching and Learning

We have been using asynchronous online discussion in many various courses ranging from diploma to graduate programs for the past 12 years. Figure 1.2 shows a model of how we integrated asynchronous online discussion in one of our

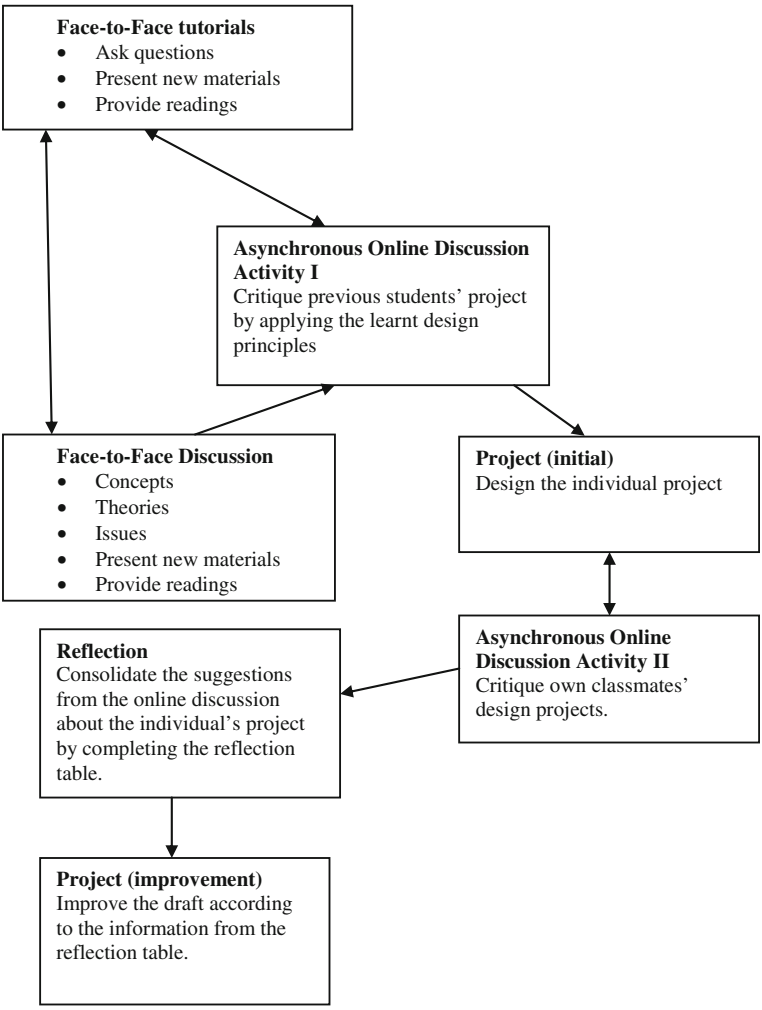

Fig. 1.2 An integration example (adapted from Cheung and Hew 2011, 2010b, 2006)

blended learning courses. Table 1.1 describes the various instructional modes and instructional activities that we used in greater detail. This particular model is based on the revised Bloom's taxonomy which has the following six levels: remembering (recalling information from memory), understanding (constructing meaning from information), applying (using a certain procedure in a given situation), analyzing (breaking material into its constituent elements and determining how the elements relate to one another), evaluating (making judgments based on certain criteria), and creating (putting elements together to form something new) (Anderson and Krathwohl 2001).

Table 1.1 Instructional mode, instructional activities and revised Bloom's Taxonomy (adapted from Cheung and Hew, 2011)

Instructional Mode	Instructional Activities	Revised Bloom's Taxonomy (Anderson and Krathwohl, 2001)
Face-to-Face tutorials	Tutor Asked questions Presented new materials, and led the face-to-face discussion: critique previous student projects	Recalling Understanding Applying Analyzing Evaluating
Asynchronous Online Discussion Activity I	Tutor Led the online discussion – critique previous student projects	Applying Analyzing Evaluating
Project (initial)	Student Drafted their design projects	Creating
Asynchronous Online Discussion Activity II	Student Uploaded their design projects Initiated the online discussion	Applying Analyzing Evaluating
Reflection	Student Completed the reflection tables	Evaluating
Project (improvement)	Student Used the reflection tables to improve their projects	Creating

In this particular integration model, we incorporated two asynchronous discussion activities with face-to-face tutorials, classroom discussions, and a reflection session. In the face-to-face tutorials prior to the face-to-face discussions, the tutor provided students with factual information, concept, and theories about the topic. The didactic instructional approach was typically employed to introduce the topic and highlight some relevant issues with pertinent reading materials (i.e., seed ideas and strategies). Students were also provided relevant reading materials. Conducting face-to-face discussions enabled the students to discuss questions related to the concepts and principles learned with their tutor.

The purpose of the online discussion activity I (critique of previous students' projects) was to find out whether the students had the ability to apply the concepts, theories, and guidelines learned in the critique of other students' projects. Students' identities were kept anonymous in the course of this activity. Essentially, online discussion activity I served as a formative evaluation of students' understanding of the design theories. The tutor was the facilitator of the first online discussion activity. After the first online discussion activity, the tutor may give extra help to students who had misconceptions of the design concepts and theories. Overall, the purpose of these instructional activities (i.e., face-to-face tutorials, online discussion activity I, and extra help for students after the online discussion) was to provide a good foundation for students before they began to design their own projects.

After online discussion activity I had ended, students were asked to create their own projects individually and upload them to their own discussion forums. Students were required to critique their peers' projects on the asynchronous online discussion platform (i.e., online discussion activity II). The purpose of online discussion II was to allow students to discuss problems, solutions, and issues related to their own project, as well as their peers' projects. The students acted as the facilitators for their own forums, and students were encouraged to get feedback from their peers.

After the discussion, each student had to summarize the discussion points in a reflection table (see Table 1.2). Essentially, the purpose of the reflection table was to help each student consolidate the feedback received, and decide how he or she would respond to the suggestions or comments made in the discussion.

Students had to indicate clearly whether they agreed or disagreed with the comments and provide justifications for their decisions. In addition, students had to explain the changes that they intended to make. In short, the reflection table provided the input for students to improve their own project designs.

Overall, a majority of the students found the asynchronous online discussion activities useful and enjoyable because it enabled them to share ideas in their own convenient time, and to examine the viewpoints from all their peers' rather than just the tutor's perspectives (Cheung and Hew, 2011). In addition, no one student dominated the online discussion. We also found that the use of asynchronous online discussion supported two critical ill-structured problem-solving processes (Jonassen, 1997): articulating the problem space, and generating possible problem solutions (Cheung and Hew, 2004).

1.3.3 Participation in Asynchronous Online Discussions

Although asynchronous online discussions may afford certain advantages, such benefits unfortunately can only be enjoyed if students choose to participate in the discussions in the first place (Hew and Cheung 2010b, 2006). Typically, in an asynchronous online discussion environment, a student may participate in the discussion in two major ways—reading and writing messages (Hewitt and Brett, 2007; Lipponen et al. 2003). Reading messages means that the student reads the notes posted by others without contributing any posts to the online discussion (Lipponen et al. 2003). Although individual students could learn by simply reading messages, such an act does not really contribute to or encourage the exchange of ideas in the discussion, because if no postings of messages are made in the first place there will be no messages in the discussion for students to read (Hew and Cheung 2010a).

Participation by writing, on the other hand, requires the student to externalize his thoughts and post the messages in the discussion forum. Bereiter (1994) stressed the importance of externalizing what is in our mind as concrete ideas (e.g., messages) in a discussion forum so that these ideas can be worked on and

Table 1.2 Reflection table with sample students' inputs (extracted from Cheung and Hew, 2011, p. 1329)

	Suggestions made by others	My opinion	Rationale	Changes that I can/will make
1	Teacher shouldn't be present when web activity is done in school lab. I will remove the presence of the teacher in the lab, in my project report.	Agree strongly		Correct project guideline. I mistook that the teacher can be present as long as they are not involved in teaching directly.
2	Incentives/rewards (stickers etc.) for good work produced (e.g., for creativity; well-thought concepts etc.).	Agree	I found that giving rewards for activities increases motivation amongst students. (from personal experience)	I could indicate that pupils who provide good understanding in their worksheet answers will be rewarded a sticker.
3	Change activity to a revision instead of an introduction to topic (*because the purpose is to help students prepare for the final exams.*)	Disagree	Introduction to topics are a vital part of helping pupils prepare for the final exams as basic concepts learnt in the introduction are also tested.	No changes. I will still keep the web activity to being an introduction to the P5 Science topic of Materials
4	Modify worksheet to include more items in addition to "Cup" to test for suitability of materials (e.g., school bag/ spectacles) I will include at least another 1–2 items that require more than 1 material to be made from in my worksheet.	Agree strongly		By including more appropriate items, pupils are able to clearly understand that more than 1 material can be used to make an item.
5	Combine with idea suggested in (4.) to conduct cross-subject teaching. - Use Art lesson to allow pupils to create drawings of items with materials indicated.	Agree	Cross-subject teaching, allows total immersion in topic being taught.	I could specify in my closing comments that pupils are given time during their art class to draw out their impression of items being made from unsuitable materials.

improved through social interactions such as questioning, clarifying, or elaboration. In this book, we focus primarily on participation through writing. This is because writing is closely tied with discussion and it can subsume reading, as in the case when a student is replying to an existing discussion message (Guzdial and Turns 2000).

Several researchers (e.g., Davies and Graff 2005; Dennen 2005; Gaspar et al. 2010; Mazzolini and Maddison 2003; Nagel et al. 2009; Palmer et al. 2008; Yukselturk 2010) have suggested that a necessary, if not sufficient, condition for a discussion to aid learning is for students to participate by posting a sizeable number of messages such as comments or questions. For example, Nagel et al. (2009) found a significant difference in the number of posts from students in different grade groups. Nagel et al. (2009) reported that students who failed or abandoned the course posted on average significantly fewer messages in the online discussions than their successful counterparts. On average, the high performing students were active in the discussions and responded to other comments.

The finding of Nagel et al. (2009) study was corroborated by Yukselturk (2010), who found that students' contribution level (i.e., number of post) in a discussion forum was significantly related with student achievement. Palmer et al. (2008) similarly reported that the number of new postings made to the online discussion was significantly related to a student's final unit mark. More recently, Nandi et al. (2011) found that in general, most of the students with higher number of posts achieved distinction or higher distinction grades in the assignments and final assessment. On the other hand, most of the students with few postings either failed or just passed the course. Nandi et al. (2011) concluded that higher achieving students tended to participate in the online discussions more actively than other students did. Gaspar et al. (2010) also found that successful students (i.e., students whose performance in exams exceeded 70 %) tended to contribute more postings, such as questions, that were related to higher cognitive levels indicated in the revised Bloom taxonomy (Anderson and Krathwohl 2001) such as the *analyze* and *evaluate* categories, while failing students posted questions related to lower levels such as *remember* category.

1.3.4 Limited Student Contribution

Unfortunately, students who actively post or contribute in online discussions are usually few in numbers. They are typically the exceptions, rather than the norm. More often than not student contribution in online discussions is limited. In this book, we define limited student contribution as students posting no or few messages, students demonstrating superficial or surface-level critical thinking, or students exhibiting low-level knowledge constructions.

Many previous studies have found that limited student contribution in online discussion forums to be a persistent and widespread problem (Burt et al. 1994; Cheong and Cheung 2008; Cheung and Hew 2004, 2006; De Wever et al. 2006;

Gunawardena et al. 1997; Guzdial 1997; Hew and Cheung 2003a; Hewitt 2005; Hewitt and Teplovs 1999; Jamaludin and Quek 2006; Kanuka and Anderson 1998; Khine et al. 2003; Kucuk et al. 2010; Lazonder et al. 2003; Lee et al. 2011; Maor 2010; McLoughlin and Luca 2000; Nandi et al. 2011; Schellens et al. 2005; Wan and Johnson 1994; Yukselturk 2010).

For example, Guzdial (1997) in his investigation of 18 classes at the Georgia Institute of Technology found that the average thread length was only 2.2 messages, which essentially contained one single message and a response to that message. This is similar to what Henri (1992) referred to as quasi-interaction, which merely involves only two actions: person A communicates with person B and a response from person B. Hewitt and Teplovs (1999) arrived at a similar conclusion after studying the online discussions of seven graduate classes at the University of Toronto. They reported an average thread length of only 2.69 messages. In a later study, Hewitt (2001) found that each student, on average, contributed between two and three messages a week, and that 94 % of the 830 student messages either made no reference to other messages, or only made a reference to one single previous post.

Elsewhere, Wan and Johnson (1994) found that university students contributed less than one message per week; Lee et al. (2011) reported that as many as 50 % of students did not contribute any post; Kucuk et al. (2010) lamented that almost all students (95 %) did not contribute in the online discussion, while Cheung and Hew (2006) reported that many students' discussion ended up a mere question–answer session where participants simply answered their peers' questions instead of taking the discussion to a deeper level.

1.4 The Purpose and Plan of this Book

Why does limited student contribution in asynchronous online discussion occur? How can we alleviate this problem and deal with this challenge? In Chap. 2, we review over 110 empirical studies in order to identify the various reasons or factors leading to limited student contribution in asynchronous online discussion. In Chap. 3, we identify certain empirically based strategies to overcome these limitations. Instructors may use these strategies to increase student contribution, or foster student in-depth critical thinking or higher knowledge construction levels in an online discussion forum. In Chap. 4, we discuss several strategy dilemmas. These are strategies where previous empirical research shows mixed or inconclusive results when they are implemented. Acknowledging these dilemmas is essential for instructors to make informed decisions about the discussion strategies they are considering implementing in the future. In Chaps. 5–7, we report and discuss ten case studies on student or peer facilitation. The use of peer facilitation could provide a possible alternative strategy to alleviate the instructor-facilitation dilemma. In Chap. 8, we discuss certain conditions or situations that may best be addressed using either peer or instructor facilitation. In Chap. 9, we discuss the use

of asynchronous audio discussion. Finally, in the conclusion chapter we discuss future research directions concerning the use of online discussion in education context, particularly with respect to mobile learning environments.

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