Knowledge Construction via Asynchronous Discussion Forums

A Case Study: the Dynamics of Knowledge Construction over a Post-Secondary Asynchronous Discussion Forum in a Blended Learning Course

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ABSTRACT

The advance of Web 2.0 and the realization of cloud computing technology have enabled the flourishing of asynchronous discussion forums (ADFs) over the online community. Many Learning Management Systems (LMSs) nowadays such as Blackboard or Pepper allow students to post their thoughts and comments that are related to the course content on a platform where students can read and learn from each other’s postings. Although many studies have addressed the dynamics of such discussion forums, a few studies have discussed the learning outcome and the effectiveness pertaining to this new form of learning at the individual level. This case study focuses on answering the following research questions: How is knowledge constructed over this new learning platform? In which ways do the dynamic of asynchronous discussion forum shape the learning experiences and opinion formation of an individual participant?

Both Social Network Analysis (SNA) and content analysis of the asynchronous discussion forum as well as interviews with two distinct participants were conducted. The findings suggest a preferential attachment model of ADF. Discussion threads grew based on students’ facilitation methodology, interests and knowledge background. The results identified the potential risks of having non-homogeneous participation in ADFs. It is suggested that the balance between a rich discussion as well as attentive reading and constant reflections, enable better learning experiences and facilitates less affected opinion formation. The results once again confirmed the value of having a safe online discussion environment. The results have implications to guide better practices using ADFs in the educational context for both the students and the instructors.

Keywords: asynchronous discussion forums; computer-supported collaborative learning; social constructivism; social network analysis; content analysis; knowledge construction; opinion formation.
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The people most important to me have been my main source of motivation in order to complete this study and finish up the report. So here I am finally! I would like to thank all of my teachers and professors in the past and throughout this program for their guidance and encouragement; my friends and family for their unconditional love. This list is endless and my gratitude for everyone who has made our encounter meaningful would be too lengthy to put into several words.

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“At times our own light goes out and is rekindled by a spark from another person. Each of us has cause to think with deep gratitude of those who have lighted the flame within us.” (Albert Schweitzer)

Words may never express how precious this program has been to me. This program enabled so many life-changing moments that made my stay in Toronto meaningful and fulfilling. I am now filled with hope and joy knowing what I will be able to contribute to society in the future. I thank all of those people who have recognized and acknowledged my efforts and sincerities.
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CHAPTER ONE

1.1 Background of this Study

The advance of Web 2.0 and the realization of cloud computing technology have enabled the flourishing of asynchronous computer-mediated communication online. Over the past few decades, such advancements has sparked and facilitated the proliferation of online courses, degree programs and institutions. In order to stay abreast with the technology frontier and remain competitive in the academic field, besides all the independent sectors which have extensively adopted the E-learning strategy, many of the corporate universities and traditional universities also took advantage of online learning environments. E-learning is thus incorporated as an essential part of the distance education program as well as blended learning design (Lewinson, 2005).

Because of the convenience and flexibility of the online learning environment, online education programs have been growing rapidly and have attracted more than 70 million adult learners (Smith, 2005). Among these computer-mediated learning platforms, asynchronous discussion forums (ADFs) continue to be an essential component that garner both interests and critiques as an effective tool for supporting student-to-student interaction in both a pure online course and blended learning classrooms (Lewinson, 2005, Swan & Shea, 2005).

Computer-supported collaborative learning (CSCL) which are used interchangeably with ADFs implies that learners are collectively involved in an argumentative discourse of which the goal is to construct and acquire knowledge (Weinberger & Fischer, 2006). An individual learner composes elaborated, well-grounded messages relating to a learning task and posts them to an online forum (Weinberger & Fischer, 2006). These messages are read by the learning partners who would then reply with critique, questions, refinements, and so on. (Weinberger & Fischer, 2006). Past studies have
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demonstrated that learning with ADFs accounts for 40% of all E-learning activities and for 80% of what was described as “learning with others” online (Smith, 2005).

The asynchronous nature of CSCL offers various benefits that a regular classroom fails to provide. For instance, ADFs are available 24 hours a day and 7 days a week. Therefore, it allows student-to-student communication to occur at any time and any distance (Guzdial & Turns, 2000). This time and place flexibility offers access to education that might not be possible otherwise for a great number of learners (Schrire, 2006).

ADFs establish a differentiated, learner-centered learning environment, and are thought to support equity by enabling parallel participation. In ADFs, learners can elaborate their contributions without interrupting their co-presenting peers. In ADFs students can participate at a time and place when they feel ready (Gibbs, Simpson, & Bernas, 2008). They can work with ideas at their own pace (Prestera & Moller, 2001). Contributing to an online discussion has been reported to be less threatening than speaking in front of the entire class (Wise et al., 2012).

Research shows that the use of ADFs in educational settings are thought to support a broader variety of students, particularly the weaker students, students who are shy and less articulate (Clark, 2003) as well as some minority groups who often feel reluctant to speak out (Wise et al., 2012). Using ADFs is believed to be more democratic than having face-to-face discussions.

One of the most common reported benefits of having ADFs as a learning platform is that ADFs better foster critical thinking skills and in-depth argumentation (Weinberger & Fischer, 2006; Chan, Hew & Cheung, 2009). The asynchronous format of ADFs allow students to take as much time as needed to reflect on the entries contributed by the others and compose their own argument in response (Guiller, Durndell & Ross, 2008). The increase in the time available to think and consult sources before responding in an asynchronous discussion promotes greater reflection and higher level thinking in
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comparison to face-to-face discussions (Roberts & McInnerney, 2007). Research conducted by Alavi (1994) Fjermestad (2004) and Cacciamani (2010) has shown that university students engaged in online collaboration have explored more opinions in their problem-solving tasks. Students engage in broader, more complex and more cognitively challenging discussions (Jung, Kudo & Choi, 2012). Moreover, research conducted by Newman, Johnson, Webb and Cochrane (1997) demonstrates that ADFs encourage learners to reflect upon their learning, which again help to promote richer learning, as well as clearer and more precise thinking (Ling, Cheung & Hew, 2009).

“It is good to hear diverse perspectives.” (Smith, 2005) ADFs intrinsically promote the co-construction of knowledge (Brindley, Blaschke & Watlti, 2009) and the introduction of different perspectives. It has been reported that more heterogeneous groups, consisting of students with different age, gender, cultural and educational backgrounds, usually produce a richer learning outcome (Kagan, 1997; Johnson & Johnson 1989).

Aside from the previously mentioned benefits of using ADFs, some research also indicates that students involved in group learning have the ability to develop improve their social and communication skills (Roberts & McInnerney, 2007). These skills include developing rapport with others, negotiating a framework to work together, and generating as well as sustaining motivation while working in collaboration (Roberts & McInnerney, 2007). Within Ananidou and Claro’s (2009) article entitled, “21st Century Skills and Competences for New Millennium Learners in OECD countries” collaboration is identified as one of the key competencies required for learners to deal with the challenges of the unpredictable and rapidly changing world of the 21st century. Their statement suggests ADF is not only an advantageous learning platform, but also a useful tool for learning skills training.

Given the potential benefits that ADFs provide, there are also foreseeable limitations of such a platform. Ironically, many of the disadvantages are associated with its advantages. For instance,
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asynchronicity decoupled the timing of learners’ participation in discussions, which creates opportunities for more reflective dialogue (Harasim, 2000), but also generates challenges in the coherence and flow of the conversation (Wise et al., 2012). It has been reported that if a post received no reply within 24 hours, the discussion thread tends to end prematurely without further cognitive discourse (Wise et al., 2012).

To a certain extent, ADFs promote equity and differentiation. However homogenous participation among group members is not usually the norm in the online environment (Roberts & McInerney, 2007). Therefore, Lauzon (2000) cautions that online collaborative learning may reinforce the dominant ideology and transfer established privilege and social hierarchy during the consensus formation process (Smith, 2005).

The most often reported disadvantage of ADFs was the lack of nonverbal cues. The communication challenges within the online environment might have caused the participants’ ambivalence toward the online group work (Dirkx & Smith, 2004; Smith, 2005). In comparison to the learning experiences in the classroom, students have reported significantly more difficulties in relating to other students when using ADFs (Kamin et al., 2001; Guiller et al., 2008). The limited nonverbal communication cues spontaneously increase the time needed to make decisions and reach consensus. This in turn may result in less participation in ADFs, as students are reluctant to share opinions that might offend their learning partners.

Some past studies illustrated a rather disheartening picture. Some reports found that students often do the minimum work just to fulfill participation requirements (Dennen, 2008). Some other research found that students have utilized efficiency-oriented strategies (Hewitt, 2003; 2005; Peters & Hewitt, 2010). Students tend to read selectively, or skim through messages, with passive levels of
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participation (Hewitt, 2003; 2005; Peters & Hewitt, 2010). The free-rider effect was another commonly cited disadvantage of using ADFs (Roberts & McInnerney, 2007).

1.2 Purpose of this Study

The field of CSCL presents both valuable learning opportunities and challenges for both the students and educators of the 21st century. ADFs have already become an inseparable part of many types of curriculum and program design. To guide better practices within the online learning environment, and to benchmark instructional quality within the increasingly competitive marketplace of education, having better grounded theory for the implementation of asynchronous discussion in the educational context became increasingly essential.

Most of the research on ADF has theoretically framed the practice of asynchronous discussion as a social constructivist pedagogy. According to social constructivist theory, knowledge consists of multiple truths rather than single and identical truth; knowledge did not innately exist before it was created by the learners “who participated in its construction” (Lincoln & Guba, 1994). The Practical Inquiry Model of Cognitive Presence (Garrison, Anderson & Archer, 2000; 2001) defines the development of critical thinking in ADFs as a collaborative and collective knowledge building inquiry. Such a definition emphasizes the importance for collaborative learners to transact with one another, contribute to, and use, one another’s perspectives in solving a task. In this practical inquiry model, forum discussion involves four phases: presence of a triggering event, phase of exploration, integration, and resolution (Schrire, 2006).

The consensus building process, therefore, provides space for meaning making (Bruffee, 1999) and self-reflection (Schon, 1990). Through iterative cycles of discussion and reflection (Schon, 1990), learners gather information, and integrate their own perspectives with relevant theories to promote changes in beliefs and the construction of a newer state of mind (Smith, 2005).
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Contemporary research describes controversial results on the participation, dynamics and effectiveness of knowledge construction using ADFs. Although the pattern and dynamic of ADFs have been studied extensively, most of the research has been concerned with the entire online community as an intact entity. Little research has been done on how group dynamics could shape personal learning experience. This research aims to shed more light on dynamic of knowledge construction in ADFs. More importantly, it seeks to understand how the collective knowledge construction process in ADFs could shape the learning experience and opinion formation of an individual.

1.3 Research Questions

This study intends to explore the following research question: How is knowledge constructed in ADFs? I seek to answer this question on two different dimensions. I first study this question on the collective dimension, where I seek to understand the dynamics of the entire discussion forum. Then, I examined the individual dimension of knowledge construction. The two sub-questions related to the major research question are:

1. What does the knowledge construction process look like in an ADF?

2. How does the knowledge construction process in the ADF affect individual learning and opinion formation?

Under the first sub-question, I investigated a) How did the discussion threads grow over time? b) How did individuals participate? c) What did each individual contribute to the entire forum and the knowledge construction process?

Under the second sub-question, I examined a) how individual opinion formation might differ among all participants, and b) how individual opinion formation might differ having experienced different knowledge construction dynamics.
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Overall, this study should provide both an overall picture of the knowledge construction process in an ADF as well as a snippet of individual learning experiences. The results should provide implications to guide more effective, holistic and equitable practices using ADFs.

1.4 Background of the Researcher

I am a Chinese immigrant born and raised in Beijing, the capital of China, for the first 16 years of my life and have been educated in Canada for 10 years. My interest in educational technology and E-learning was mostly inspired by my mother, who has been a veteran software designer and engineer for over 30 years. Her aspiration of lifelong learning and her achievement of winning the national software designing competition in her 50s without a university degree (She wasn’t able to study during the Cultural Revolution) have greatly inspired my aspiration to keep challenging, breaking away from my comfort zone. Because of her, I gained a deeply rooted passion for trying and learning new things for my entire life.

With this deep and rather passionate desire to continue learning, I’ve voluntarily participated in over 5 MOOCs over and above my own program requirement in the most recent two years. I am not a huge fan in pure research. To me, research would be motivating only when it provides implications that direct better practices. The same goes for my philosophy of knowledge. I was never motivated to learn just for the sake of knowing, but more for the purpose of using and applying knowledge to make effective changes.

Although having participated in many MOOCs, I have not been an active participant using ADFs. I became interested in the field of asynchronous E-learning in my first year of the MT program. However, at that time, I had no clear direction of what particular topic I would look into or how I would carry out a research study on asynchronous E-learning. When I first started my education in Canada as an ESL student, I had a hard time trying to grasp what the teacher was teaching in class. Having had this huge
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communication barrier, I felt reluctant to seek help from either my classmates or my teachers. The only backup learning strategy I relied on was reading the textbooks. During my undergraduate study at the University of Ottawa, Dr. Houseman’s well developed website for Animal Forms and Function, as well as the Digital Zoology he developed and published with McGraw-Hill Higher Education greatly facilitated my learning. I still use them as valuable learning sources to date.

My initial interest in asynchronous E-learning was mostly on the use of the teacher’s website, educational video, e-mail, and learning management system. These types of asynchronous E-learning have helped me, and I wish it could benefit more students who have virtual disadvantages, who want to keep-up with their learning or simply desire to learn more. Having an international background, I also sense that E-learning could be a great way to introduce the Canadian classroom to my home land or anywhere in the world where proper learning is insufficient or absent.

My desire to study ADFs arose after having had a chance to partake in a social network analysis course offered by the University of Michigan. Upon the completion of this course using Coursera, I have gained great insight of possible research methodologies to conduct this research. My desire of applying the knowledge learned in this relatively new field made me determined to finally complete this study on asynchronous discussion forum. The more I looked into this social constructivist phenomenon, the more fascinated I became by the knowledge construction process and how it might affect our learning and opinion formation as an individual.
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CHAPTER TWO

2.1 Social Constructivism and Syndicate Learning

The leap of technology in the 21st century has provided invaluable life-long learning opportunities which may have never been available otherwise to learners worldwide. The advancement of Web 2.0 and cloud computing technology enables learners to engage in learning and communication anywhere with internet access and at any time of their own convenience. More and more learning resources are digitalized and uploaded for free access online. Teachers are no longer the only source of expertise in any given subject. The old paradigm where educators are the only sage on the stage has become more and more outdated. Education ceases to be a simple and sole process where the teacher transmits knowledge to the learners.

This declining climate of teachers being the sage on the stage makes more and more policy makers, administrators and educators themselves aware of and advocate for the merits of a more learner-centered approach in education. Social constructivism is a theory of knowledge that applied philosophical constructivism into educational settings. It states that knowledge is a collectively created educational product by each and every member within the learning community, and this community includes both the teachers and the students. Syndicate learning or group learning, therefore, is a constructivist activity. Syndicate learning enables knowledge production among learners where each member was encouraged to contribute their own understanding and negotiate to a final, shared understanding (Alant & Dada, 2005).

The goal of having collaborative groups is to achieve consensus and shared classroom authority (Bruffee, 1999). The theoretical benefits of collaborative groups seem the most ideal and have proven to be useful for adult learning contexts (Bruffee, 1999). Group members’ different points of view and expertise are brought together into a synthesis of knowledge via discussion. Not only were many of the
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post-secondary institutes have already implemented this pedagogy in face-to-face meeting sessions, constructivist approach of education also extended its way online as part of the E-course design and in blended learning courses.

2.2 Asynchronous Discussion Forum (ADF)

Asynchronous discussion forums (ADFs) are usually powered by a learning management system (LMS). The innovation was designed based on the constructivist approach to learning, and was used to foster active individual knowledge construction via active learning, self-reflection, and collaborative learning. (Schellens & Valcke, 2006) “To date, 60 percent of post-secondary institutions in the States offered online courses and 35 percent offered hybrid courses” (Parsad & Lewis, 2008). “The same report showed that 92 percent of these hybrid and online classes make at least moderate use of online, asynchronous discussion with 75 percent reporting extensive usage.” (Welzer-Ward, 2011)

In order to extend the learning activities beyond the traditional classroom time and space, asynchronous online discussion has been increasingly integrated into educational settings (Xie, DeBacker, & Ferguson, 2006). However, interestingly, its predominance was not entirely based on proven effectiveness or grounded research that guides better practice. The popularized usage of ADF in higher education was an ex post-facto phenomenon in response to changes in student demography, shifts of higher education market, and more innovations of new technologies (Concannon, Flynn & Campbell, 2005). The growing interest to create frameworks that guide better practices using ADFs has thus come after the fact that ADFs were already widely in use (Paulus, 2006).

Much of the past research has focused on the quantitative analysis of knowledge construction processes such as the amount of contributions made by each student, the entire learning community, as well as the topology of different discussion forums. Some have focused on group and individual learning dynamics and have studied participants’ behavior as to how and when to participate. Several have
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touched upon the knowledge construction phases within a learning community. Very few focused on the group learning outcomes. This study aspires to build the missing link between group learning dynamics and individual opinion formation.

2.3 Participation Dynamics over ADFs

2.3.1 The Importance of Sustained Participation and the Evidences of Sustained Participation

The importance of active participation for learning over ADFs has been widely recognized (Morris, Finnegan & Sz-Shyan, 2005). Gao, Wang and Sun (2009) proposed that productive learning only occurs when members within the learning community are able to effectively share, comprehend, critique and construct knowledge via discussion. Therefore, in order for social constructivist learning to take place, sustained online discussion is a must.

Past studies have found three types of discussion topology among which only one demonstrates sustained discussion. When one and only one note was followed by the proceeding note, it was referred to as a short thread pattern. An extended thread pattern consists of a chain of posts that were serially connected to one another. When two or more posts emanated from a single note, this was referred to as split thread pattern (Chan, Hew & Cheung, 2009).

A sustained discussion is represented by an extended thread pattern. A successful ADF topology should ideally be characterized by extensive split thread pattern followed by extended thread pattern (Chan, Hew & Cheung, 2009). Past research studies, however, have found that the average thread size was less than three posts. Most discussion threads consisted of only one single response and ended up forming a short thread pattern (Guzdial, 2000; Hewitt, 2005; Chan, Hew & Cheung, 2009). However, some research also found more optimistic results where extended thread pattern occurred slightly more
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than twice as often as the short thread pattern. In an earlier research by Hewitt (2003), he found nearly three times as many instances of the extended thread pattern.

The assumption that active participation in asynchronous online discussion is important for learning has inspired many researchers to search for factors that impede, or otherwise shape, online discussion dynamics.

2.3.2 Factors Affected Online Discussion Dynamics

2.3.2.1 Online Format and the Asynchronicity of the Discussion thread

One factor that can affect the level of participation is a lack of trust and an absence of non-verbal cues in the online learning community.

An emotional conflict that a person has to face when participating in syndicate learning is an unconscious tension between the fear of de-individualization and the estrangement from the group (Smith, 2005). “All humans crave the possibility for self-expression yet the work required to reach consensus threatens individual voice within a group voice.” (Smith, 2005). This fear of not being accepted by other members and the fear of losing one’s individuality while participating would only be exaggerated in an online community as participants would not likely to receive non-verbal cues or verbal cues in a timely manner.

Past studies have found that if members within an online community have built personal relationships beforehand, they were more likely to trust each other and participate in an online asynchronous format. However if they did not know each other, they would feel less comfortable when contributing to the forum, not knowing other members’ reactions to their posts (Ling, Cheung & Hew, 2009).
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The asynchronicity of the ADF may also affect discussion participation. “Too much lag-time waiting for a reply violates students’ expectations and need for acknowledgement, leading them to disengage and reducing the discussion’s momentum” (Dringus & Ellis, 2010). The proliferation of posts might become overwhelming (Rovai, 2007) and unorganized, which may make it difficult for students to follow (Dringus & Ellis, 2005).

2.3.2.2 The Design of ADF and the Topic being discussed

Past studies have also found that the topic being discussed may also influence participation dynamics. Students’ familiarity with and interest in the topic could both affect the dynamics of participation (Gao, Zhang & Franklin, 2013).

Many threaded forums are set up in ways that emphasize the most recent or unread posts rather than posts with important or un-discussed content (Hewitt, 2003). These features promote a tendency for participants to concentrate more on recent postings and less on older messages (Hewitt, 2003; 2005). Such behavior usually leads to premature thread termination of older but important threads (Chan, Hew & Cheung, 2009). This shift of focus was also observed by Lambiase (2010) as the percentage of posts around one topic in the discussion forum gradually decayed to 33% in about a week.

The hierarchical structure of discussion threads sometimes fails to represent the complex interrelationship of discussion posts. “Online discussions may be much more intertwined and interrelated than what the threaded representation indicates (Hewitt, 2001).” The students may have difficulties deciding which posts to read before integrating relevant ideas into his or her response. As a result, students may end up composing poorly interrelated monologues.
2.3.2.4 Peer Facilitation

Peer facilitation during discussion has been found to be one of the most significant factors that affected online discussion dynamics. Examples of facilitating techniques include thanking others, clarifying/elaborating, setting new directions, considering others’ ideas, asking open-ended questions, and encouraging contribution (Ling, Cheung & Hew, 2009). The peer facilitation techniques perceived by the participants to have influenced their participation in the ADFs were: “asking open-ended questions,” “clarifying/elaborating,” “encouraging contribution,” “considering others’ ideas” “setting new directions” and “thanking others” in the order of percentage of respondents (Ling, Cheung & Hew, 2009).

Chiya (2003) suggested that frequent encouragement with positive feedback reduces anxiety over making mistakes in the early stages of asynchronous discussion thus effectively promoting greater participation (Jung, Kudo & Choi, 2012). The occurrences of pivotal posts that consist of disagreement or question usually lead to the continuation of discussion threads. After a pivotal post, a responsive post with new ideas was more likely to be followed by subsequent posts discussing the new ideas. Chan, Hew and Cheung (2009) have found in their study that “the application of questioning facilitation technique had the effect of continuing the discussion all the time (Chan, Hew & Cheung, 2009).” A combination of summarizing and questioning also increased the likelihood of discussion thread succession (Ling, Cheung & Hew, 2009).

Other results have been found for posts containing extensive summaries in the middle of the discussion. While few students were likely to post after the wrapper post, summarizing existing ideas in the middle of the discussion may help students integrate their understanding and facilitate further participations (Wise & Chiu, 2011). The use of summarization with acknowledgment of other members’
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contributions and the use of summarization with resolution tended to result in the highest chance of early thread termination (Chan, Hew & Cheung, 2009).

Other members’ reactions toward potentially a negative comment was the most important indicator of discussion continuation. If members within the learning community have demonstrated through their participation that they are not easily offended and are open to feedback, all members tend to participate more in the discussion (Ling, Cheung & Hew, 2009).

2.4 Modeling Collective Knowledge Construction (KC) Dynamics

Although active and extensive participation within an online ADF are factors that enable effective learning, active and extensive participation does not guarantee effective learning. Effective learning happens when members of the online community are engaged in deep conversation and are involved in higher level thinking. The extensiveness of discourse or the bulkiness of discussion topology is unable to model the depth or the quality of KC dynamics. Researchers have tried to model KC dynamics by coding different thinking purposes and thinking phases for the discussion thread under study.

2.4.1 Gunawardena’s Challenge Model

One popular model of KC in ADFs proposed by Gunawardena, Low and Anderson (1997) conceptualized the KC process in the following five phases.

1) Sharing information: At this stage, members of the learning community share their own understanding with everyone else in the group.

2) Exploring Dissonance: At this stage, members are made aware of different and potentially conflicting opinions.
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3) Negotiating Meaning: At this stage, members engage in the co-construction of new knowledge by proposing argument and counter argument to reach consensus or a shared understanding.

4) Testing and modifying: At this stage after members have reached consensus, members test the newly constructed understanding for its validity and make minor tweaks around the understanding.

5) Summarizing and applying: At this stage, members of the community summarize, apply the newly constructed and tested knowledge.

This model was also referred to as the challenge model of KC because of its emphasis on the resolution of conflict by negotiating dissonance in the KC process (Paulus, 2006). One interpretation of the KC process proposed by Gunawardena et al. was that the progression through each KC phase was a cumulative group effort (Wise & Chiu, 2011). Transitions between the phases were usually ignited by a pivotal post, which ends the lower phase and initiates the higher phase (Wise & Chiu, 2011).

Past results have shown that the challenge model of KC has theoretically and empirically grounded the KC research. However, the progression from lower to higher KC phases has been much more complex than what was proposed by Gunawardena et al. Most research has revealed distinct KC patterns of sharing, negotiating and summarizing but not exploring dissonance or testing tentative knowledge construct (Wise & Chiu, 2011). Students produced new ideas much more often than considering existing ideas. This behavior has caused the discussion to remain at a lower KC phase. Some research even found that the discourse of online discussion tends to primarily remain in phase one (Kanuka & Anderson, 1998; Garrison, Anderson, & Archer, 2001; Islas, 2004). In a past study by De Wever et al. in 2007, learners had many more posts in KC phase five without going through phase three or phase four (Wise & Chiu, 2011). The lack of disagreements in discussion may be due to the concerns about social relationships. Based on the challenge model of KC, these researchers conveyed a sense of
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disappointment regarding the low quality of KC process in ADFs in general. Another past study also
found that facilitation techniques that promoted discussion thread growth did not seem to affect the
depth of discussion (Ling, Cheung & Hew, 2009).

2.4.2 Paulus’s Connect Model

Paulus (2006) found similar results as stated in the previous section. Although she observed
disagreement in the discussion thread, these disagreements were not yet overt enough to be coded as
Phase two. According to the challenge model, for a functional move to be qualified as phase two, areas
of inconsistency or disagreement must be stated with certainty and arguments made to support one’s
position. They also found that negotiation seemed to be underway within phase one, which may have
prevented the actual phase two from occurring. There was a tendency that members mitigate possible
disagreement and negotiate dissonance before they progress into phase two of the challenge model
(Paulus, 2006). Their result was similar to the findings from the previous studies; most of the discourse
remained in the first KC phase.

Paulus proposed that her observation revealed a limitation of the challenge model, which
emphasized too much on advocating for one’s view and refuting the opposition for new knowledge
construction (Paulus, 2006). Members within the learning community, according to her observation,
instead of justifying one’s own opinion, sought to connect with each other by first understanding and
acknowledging each other’s viewpoints, even though they may have been different from their own
(Paulus, 2006). They suggested alternatives by raising questions and elaborating their own ideas instead
of using grounded argumentation. They elicited feedback by trying to connect with the others’ opinions.
Their result was supported by Tan et al. (2001) who found minimal evidence of opposition and counter-
opposition in their study. Paulus also asserted that the use of challenge model before establishing trust
among community members may cause conflicts and may even be harmful to learning (Paulus 2006).
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Therefore, they proposed the connect model of KC dynamics. They proposed that rather than a challenge model of argumentative discourse, participants engaged in a relationship-oriented discourse of connection. Knowledge was constructed as each member seeks connection with each other’s viewpoints. A connected knower attempts to understand the other point of view and to discover the reason for it, rather than justifying its validity. The connect model of KC dynamics emphasized connection, uncertainty, and possibility but not justification, certainty or argumentation.

2.5 Individual Knowledge Construction (KC) Dynamics

2.5.1 Individual Participation and Transactivity

According to Piaget’s cognitive development theory, learners perceive and adapt to new information via assimilation and accommodation. Both are processes of fitting new information into pre-existing cognitive schemas. Assimilation involves using pre-existing schema to make sense of the new information. Accommodation describes the alteration of pre-existing schemas in order to fit in the new information. This active integration of information while creating a new knowledge pool invokes three types of processes: selecting, organizing and integrating (Mayer, 2001). In an online asynchronous learning environment, individuals’ cognitive processes were usually expressed more explicitly with more details in forms of writing. Each learner’s cognitive output became relevant input for the other learners (Schellens & Valcke, 2006). The extent to which learners operate on the reasoning of their peers has been termed “transactivity” (Teasley, 1997). Transactivity of learners’ discourse was positively related to individual knowledge acquisition (Schellens & Valcke, 2006).

Knowlton’s model (2005) has identified five types of participation over ADFs. These types of participation in the increasing order of the amount of participation were passive, developmental, generative, dialogical and metacognitive participation. Developmental participation was regarded as the least transactive social mode, whereas conflict-oriented consensus building through dialogue and
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metacognition was the most transactive social mode on Teasley’s scale (Weinberger & Fischer, 2006). No data could be retrieved for passive participation. The passive participation was sometimes referred to as the free-rider phenomenon and has been considered a less-effective learning strategy. However, these papers failed to recognize that passive participation may involve the most amount of metacognition and could essentially be the most transactive type among all types of participation.

2.5.2 Group KC Dynamics VS. Individual KC Dynamics

There has not been much researched about how group activity could shape individual learning experience or opinion formation. However since individual cognitive input was heavily dependent on the contribution of the other members, it would be illogical to state that group KC dynamics has little impact on individual KC process.

A learner’s cognitive presence is the degree to which he/she constructs knowledge through sustained reflection and communication (Rourke et al., 2001). A learner’s social presence is the degree to which he/she can present themselves socially and emotionally in a learning community (Garrison, 2007; Garrison & Cleveland–Innes, 2005). Individual learning experience depends heavily on both (Traphagan et al., 2010).

Past research has found that group characteristics could affect both the cognitive and social presence of individual learners (Traphagan et al., 2010). The heterogeneity of participation among participants describes the degree of participatory variation among members. Scholars such as Rosser (1997) asserted that it might be better to have a homogeneous group which promotes educational equity. A heterogeneous group may hinder learning of specific learners (Rosser, 1997). Others state that a heterogeneous group can increase innovation (O’reilly, Williams, & Barsade, 1998). The size of the group may also affect the quality and the engagement of discussion. It has been found that an average
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to small group size better facilitate both cognitive and social presence of the learners (Alant & Dada, 2005).

Conflict ideas within the learning community were again recognized as a requisite for effective learning as they strongly increase individual cognitive presence. Cognitive dissonance was considered an important trigger for learners to reconsider their existing ideas and construct new understandings (Piaget, 1985). If disagreements were not present as part of the KC process in the discussion, then even if the group came to an acceptable conclusion, individual learners may not have made significant changes in their personal understanding. However it was also foreseeable that the conflict may decrease social presence (Wise & Chiu, 2010).

There was little research on how members within a learning community influence each other in terms of learning experience and KC dynamics. This study thus seeks to understand more about how both the group KC dynamics and individual participation could shape individual learning experiences and opinion formation.
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CHAPTER THREE

3.1 Discussion forum selection

The 72 entries used for this study were selected from the discussion forum of a course in which I participated while conducting this research. This course was a Masters Level blended learning course that included both face-to-face meeting sessions and online participation components. Online participation comprised 10% of the final grade. All 72 entries selected were composed in response to a discussion task posed by the instructor at the beginning of the school year. The discussion around this topic continued for just over one month and ended naturally when there were no more entries posted around the topic.

Discussion was carried out online using the Learning Management System (LMS) Pepper. Throughout the school year, we discussed several topics and readings using the discussion forum powered by Pepper. I was an active participant in the discussion threads selected for this study. However, at the time of participating in this particular discussion, I was not planning on conducting research on these entries. Therefore, my behavior in this discussion was not influenced by research intent.

There were three principal reasons that lead to the selection of this specific discussion thread for this study. Foremost, it was the most complete and richest discussion conducted using Pepper online when beginning this study. The second reason was that, at the time, the discussion had already naturally ended for approximately one month. The final selection criterion was that, at the time that I participated in the discussion, I was not aware that I would carry out this study. Therefore, my participation and interaction with other participants weren’t influenced by the bias of conducting this research.
3.2 Social Network Analysis (SNA)

3.2.1 The Temporal Analysis

These 72 entries selected were first analyzed quantitatively using SNA methodologies. Using Microsoft Excel, entries were first regrouped based on the length of time taken to compose them. Afterwards, the growth of this discussion thread was reconstructed graphically using Gephi, an open source software designed for SNA. It was the software recommended by Lada Adamic, the instructor of the Massive Open Online Course (MOOC) offered by the University of Michigan on SNA.

The network constructed based on the selected discussion forum was analyzed based on its topology by observation, and its randomness by comparison to the Erdos-Renyi random graph.

3.2.2 The Participation Analysis

The 72 entries used for this study were regrouped again, using Microsoft Excel, according to author and the individual each entry was addressed to. A histogram representing each individual’s participation and a degree distribution were constructed with Microsoft Excel to analyze the homogeneity of participation among all participants.

An adjacency matrix was constructed (Appendix A) using Microsoft Excel to represent the interaction among members within the discussion thread. Based on the adjacency matrix, an in-degree and an out-degree network were constructed using Gephi to represent participants’ interaction within this discussion forum on Pepper. Each participant was represented by a node, and their individual interactions were represented by edges with directions. The size of the nodes was made proportional to the amount of contribution or feedback each person was engaged with. The size of the edges is proportional the amount of interaction between two particular individuals.
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Another network combining both the in-degree and out-degree data was constructed using Gephi to represent the total amount of interaction among members. This total interaction network was analyzed for strongly connected components using Gephi’s built-in algorithms. This was used to discover participation hub and independent participants within the discussion community.

3.3 Content Analysis

3.3.1 Coding Scheme and Segmentation of Discourse Corpora

Each entry from the discussion forum was segmented into individual sentences. Sentences were then coded as the smallest, indivisible discourse component. All 72 entries from the discussion thread were coded based on thinking purposes. These thinking purpose categories were developed based on Table XIV (Appendix B), which was provided in “Content analysis coding schemes for online asynchronous discussion,” an article written by Lisa Weltzer-Ward in 2010.

All 72 entries were initially coded strictly based on Table XIV provided by Weltzer-Ward. The initial result showed that the coding scheme provided by Table XIV was too detailed, yet still did not cover all entries within the discussion forum. Certain entries within the discussion were difficult to code with any of the categories provided in Table XIV.

The coding scheme based on thinking purposes was revised to the following eight categories and the discussion forum with 72 entries was coded again.

1. Reply (Under the reply category, segments within the entry should provide new information that have never appeared in the discussion forum.)

2. Interpretation (Under the interpretation category, segment within the entry was either a summary of a previously mentioned idea, a reiteration of the idea, or an example that demonstrates an existing idea.)
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3. Acknowledgement (Under the acknowledgement category, segment served to command the validity of a previous statement with or without further justification.)

4. Conflict (Under the conflict category, segment served to disagree with existing opinions or pose alternatives.)

5. Question (Under the question category, segment served to seek information or open more discussion.)

6. Consensus (Under the consensus category, segment served to propose compromising solution.)

7. Clarification (Under the clarification category, segment served to explain an idea or misunderstanding.)

8. Off-task (Under the off-task category, segment was not related to the discussion task posted by the instructor.)

3.3.2 Macro and Micro Analysis of Discussion Topology

The discussion topology constructed with Gephi was color-coded based on the result obtained from the content analysis. Each node representing an entry was given a color or several colors based on the thinking purposes it served within the discussion. The color-coded topology was studied again for discussion dynamics.

Frequently occurring combinations of thinking purposes within a single entry were discovered using color-coded topology. Occurrence of different thinking purposes were counted when there was a continuation of the discussion. They were counted again when there was no continuation of the
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discussion. This data was analyzed with a chi-square test to determine their statistical significance in affecting discussion thread growth.

On a micro level, the conflicting opinions addressed to a specific individual were picked out from the discussion topology network. These were entries that marked in pink. All segments of the discussion forum involving conflicting opinion discussion were contoured on the discussion topology. These clusters of entries were reanalyzed for consensus building dynamics.

3.3.3 Analysis of Thinking Purpose Diversity among Individuals

The individual participation histogram was reconstructed with color codes based on the results of the content analysis. All entries contributed by one individual within the online community were regrouped based on the thinking purposes that each entry served. If one entry served more than one function, all the functions served by this single entry were equally weighted as fractions. The sum of these fractions for one entry would be one. All feedback received by each member were analyzed in a similar way. A color-coded, in-degree histogram and a color-coded, out-degree histogram were both constructed and compared for uniformity.

The occurrence of conflict and consensus was specifically analyzed for each member. If consensus was established, each time when conflict code exists on any individual (in either the in-degree or out-degree histogram) there should be a corresponding consensus code for that same individual in either the in-degree or out-degree histogram. If both consensus and conflict appeared in the out-degree histogram for the same individual, that individual has provided both conflicting opinion and resolution. If both consensus and conflict appeared in the in-degree histogram for the same individual, that individual has received conflicting opinion and received resolution. If both conflict and consensus were coded for the same member, but one appeared in the in-degree histogram and the other in the out-degree histogram; either the individual who provided conflicting opinion has received
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resolution, or that individual has received conflicting opinion and have provided resolution. The histogram was used to discover the unresolved opinion conflict among participants.

3.4 Interviews

3.4.1 Interviewee Selection

Two interviewees were selected based on their participation within the discussion forum as well as the results obtained from the SNA and content analysis.

The first participant, Kate Rogers, was actively engaged in this discussion. She belongs to the discussion hub according to the result obtained from the SNA. She was engaged in posing and receiving conflicting opinions. She reached written consensus with other members from the community, but was also engaged in discussion where her conflicting opinion was not further addressed.

The second participant, Nadia Stone, was not as verbally active in the discussion forum. She independently formed a discrete component according to the result obtained from the SNA. However, she had actively read and followed all of the threads posted by other community members.

3.4.2 Interview Questions and Procedure

A semi-structured, audiotaped interview (Appendix C), consisting of 6 questions was designed and scheduled with both participants. The two participants were not informed of the selection criteria that determined their eligibility to participate in this study. They were both asked about their belief about the purpose of this research after the interview to evaluate how their answers might have been biased in a certain direction. Both interviews were conducted at a quiet area in Ontario Institute for Studies in Education (OISE) building. Both lasted for about 30 minutes.
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One of the purposes of the interview was to see if triangulation of the result could be established with the results obtained from the SNA and content analysis.

The major purpose of the interview was to see 1. If and how various conflict dynamics and acknowledgement within the discussion forum may have shaped individual opinion formation. 2. How the difference in individual participation dynamics affected individual learning experiences and opinion formation

3.4.3 Transcription and analysis

The interview data was transcribed verbatim and printed for analysis. Data were categorized based on how they answered each interview question. Data were regrouped under each question, and the additional information was grouped as an independent category.

Data grouped under each question were then reread by the researcher and coded for emerging themes. Researcher first focused on the commonalities between the interviews, as well as commonalities relating to the reviewed literature. The commonalities shared between participants were teased out and compared with the results obtained from the SNA and content analysis.

The interview data were also interpreted for potential differences. However, due to the limited number of participants, these differences were only hypothesized for their relationship to the difference in participation dynamics.

3.5 Ethical Considerations

All written data gathered from this discussion forum was granted access by the researcher’s supervisor. Both participants in this research study were provided letters of informed consent. Participants were given enough time to read and sign the letters prior to the interview session. All participants were offered opportunities to ask questions about the process of the research study.
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Participants were not told about the nature of this research project or how they were selected to participate prior to the interview. However, this information was provided at the end of the interview sessions.

The researcher was diligent in informing the participants of their right to withdraw at any time, for any reason, from their participation in the research project. They were told they could refuse to answer any question during the interview, and their participation was completely voluntary.

Participants were assured that all personal information that could compromise their anonymity would be removed and/or concealed using pseudonyms. Both participants were granted right to pick their own pseudonyms. Both participants were informed that they were welcome to request a copy of the finished research project.

The researcher acknowledged the possibility of one ethical consideration that could arise, after obtaining all participants’ Informed Consent. The concern was with the violation of anonymity of the participants due to the small number of members within the online discussion community. The researcher thus made sure to study the phenomenon making minimal judgment. If a specific judgment were to be made in the conclusion, the researcher made sure to do so in the safest way possible and in consultation with the participants.
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CHAPTER FOUR

4.1 Discussion Thread Dynamics over Time

4.1.1 Discussion Thread Topology

Our discussion thread topology illustrated three types of dynamics, the short thread pattern that consists of one post and one reply only; the extended thread pattern that consists of several consecutive posts corresponding with the previous post and the branched thread pattern where multiple replies were made to a single post.

Figure 1. Discussion threads growth over time. Each node represents an entry posted by a member of the online community. The edges represent the hierarchical relationships among different entries.

We found that both the extended thread pattern and the branched thread pattern occurred more than four times as many instances as the short thread pattern (Table 1). These results suggest an active and engaged ADF.
Table 1. Count of different types of discussion thread dynamics

<table>
<thead>
<tr>
<th>Topology type</th>
<th>Short thread</th>
<th>Elongated thread</th>
<th>Branched thread</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>6</td>
<td>27</td>
<td>38</td>
</tr>
</tbody>
</table>

4.1.2 Preferential attachment Model of Discussion thread dynamic

The final ADF topology did not represent an Erdos-Renyi random graph. Our ADF topology followed a preferentially attached growth model. Not all branches got extended in a similar manner or to a similar degree. Certain threads were more extensively elongated or branched than the others. Such result indicates richer discussion around certain entries (Figure 1).

This preferential attachment model of the discussion thread dynamic was further confirmed with content analysis. Different thinking purposes that each entry served in the discussion significantly affected the continuation of the discussion threads. (Table 2, p= 0.068, x² = 13.19, df = 7). We found that the discussion thread tended to grow when there was a question, a disagreement or a new elaboration posted, whereas discussion often stopped when there was a combination of acknowledgement and interpretation or acknowledgment and consensus formation. There were only two rare cases where discussion stopped with disagreement only.

Table 2. Different purposes and continuation of the discussion thread

<table>
<thead>
<tr>
<th>Continuation</th>
<th>Question</th>
<th>Reply</th>
<th>Clarify</th>
<th>Interpret</th>
<th>Conflict</th>
<th>Consensus</th>
<th>Acknowledge</th>
<th>other</th>
<th>sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>8</td>
<td>23</td>
<td>1</td>
<td>7</td>
<td>8</td>
<td>0</td>
<td>20</td>
<td>3</td>
<td>70</td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>16</td>
<td>1</td>
<td>16</td>
<td>2</td>
<td>2</td>
<td>22</td>
<td>5</td>
<td>67</td>
</tr>
<tr>
<td>sum</td>
<td>11</td>
<td>39</td>
<td>2</td>
<td>23</td>
<td>10</td>
<td>2</td>
<td>42</td>
<td>8</td>
<td>137</td>
</tr>
</tbody>
</table>
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In the interviews, both participants reported that they preferentially respond to particular entries from the discussion thread. Nadia reported that she “doesn’t respond to all posts but picks and chooses.” She also reported that she picks responses “that were interesting” to respond to. She is more likely to respond to posts that she “could relate to and had experience with”. She said that whether she responds to a post “came from a place of experience and confidence.”

Although my other participant Kate did not specify which entries she tended to reply to, she suggested that topics that she often engaged with typically centered around “current events.”

Combining the results obtained from the SNA, the content analysis and the interviews, I conclude that the discussion threads were preferentially extended because of the different thinking purposes each entry served as well as the participants’ interests, experiences, expertise, and the novelty of the entries. The unavoidable outcome of such dynamics is that only certain idea got expressed, discussed, and clarified.

4.1.3 Factors interfering with discussion thread continuation

Both participants reported uneasiness before participation. Both attributed their hesitancy to factors including: whether their posts would express their opinions clearly, concisely, if their emotional biases would come through, or if their posts would be misinterpreted by other members within the community. Both participants used Microsoft Word to type in their responses before replying to any of the threads. Kate even had to distance herself from the thread for a short period to make sure her responses were not emotionally-driven. She said during the interview:

“Before I reply to this particular prompt, why people hate, I typed my answers or my responses in Microsoft Word and saved them and took about a two-hour break...I found it really helped me to truly consider what I was saying and why I was saying it, instead of
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acting very emotionally driven and react on Pepper. Especially in a thread like this of why people hate and some tensions will flaring the conversation so I wanted to distance myself from Pepper, and Microsoft word allows me to do that. So I can think through my answers.”

Nadia responded in a similar way stating:

“I usually pull up an empty document, and I type up my response. I would start to basically synthesize it the way that I, ideally would have said in person. But I can fine tune my response, so the way I phrase certain things, make sure that it is nicely put, not offensive and again when I say not offensive it means I just politically, I use politically correct terminology.”

Both participants expressed their need for a potentially safe space in the online community in order to participate. Both participants felt that more active participation would only be possible if there was previously established mutual trust among members.

Nadia provided an example of a time when mutual trust was not established due to the complete asynchronicity of a course she did in the past. Consequently, she was more reluctant to participate in that environment. She commented:

“I did them [The two online courses she participated in] online and I think when I did not meet these people, I was more hesitant...I was more reluctant to post in those courses, it was because I didn’t know the people. There was one interface where I got into Adobe classroom, where I could see my classmates, and because of their verbal cues, or their physical cues the way you look or the demeanor, then I got to establish a more like, OK, you know I start to figure out my classmates,..., I think that’s one barrier
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you also has to be aware of, there might not be as comfort level as you would have established in class, in person face-to-face.”

When the mutual trust was violated, the individuals tended to withdraw from the community and be more watchful of what to post. Kate reported to have “shut down” when she received unexpected response on the discussion thread. She stated:

“I felt like I had to watch what I was saying potentially censor what I was saying because I didn’t feel like other people are going to understand that e-learning or online communication like this is supposed to be a place where ideas can change and ideas can develop, they are not set in stone. And I didn’t feel like that was necessarily as understood…but that was a wake-up call for me to think that oh maybe people are not as understanding what we post here is not our full perspectives.”

These negative factors, might have interfered with the continuation of the discussion thread, and therefore potentially influenced with the scope and the depth of opinions posted on the discussion thread. As Kate described during the interview, when she sensed that the safe space might have been violated, she “might try to dilute my argument; I might try to make it less strong and ask more questions or pose more questions instead of taking a stand.”

4.2 Group Member Participation Dynamics

4.2.1 Homogeneity of individual participation

This group was not homogenous in terms of the amount of participation. According to the results obtained from the SNA, each individual contributed very differently in terms of their number of posts (Figure 2). Even though most participants contributed at least one entry, there were some individuals who were much more active than the majority. On average each individual contributed 3.25
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entries to the discussion forum (the first entry being a required post by the course instructor). Therefore, according to the right panel of Figure 2, our result showed a slight tendency towards lower numbers of posts among discussion participants, and more specifically, the majority of participants tended to post fewer than four entries.

![Graph showing participation among members in the online community](image)

**Figure 2.** Participation among members in the online community. The left panel shows the number of entries posted by each participant. The right panel is a degree distribution showing the occurrences of different amount of participations.

4.2.2 Non-random Interaction among Members

The participants’ interactions with each other within this group were not random. A contribution hub and a feedback hub formed among the same subgroup of people. According to Figure 3, the out-degree contribution hub and the in-degree feedback hub were formed among the same subgroup of people. This result demonstrates that more active participants in the discussion thread tend to get more feedback from other members, and that this phenomenon may have triggered further participation. The result also suggested that active participants tended to give feedback to each other but less so to the inactive or less active participants.
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Figure 3. Out degree and in degree interaction graph of the discussion thread. The size of the circle represents the total amount of posts individual contributed or the amount of feedback individual has received. The size of the arrow represents the amount of interaction happened between designated individuals. The direction of the arrow indicates the designated receiver of the contribution or feedback.

According to the result we obtained after applying the strongly connected component algorithm in Gephi, all participants from this group formed six strongly connected components (Figure 4). Within each component, the individuals exchanged ideas at least once with one of the members from the same component. Individuals from different strongly connected component were individuals that did not complete the information exchange cycle. They could have received information from members of the other strongly connected components, but such dynamics did not complete the information exchange cycle. Either information was given out but did not receive feedback, or vice versa. According to Figure 4, most members of this discussion community completed information exchange at least once, but the entire class failed to form one complete strongly connected component. There were 5 individuals who were left as independent components, while the rest of the class formed a complete strongly connected component. This was because these individuals either did not receive feedback from members of the
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discussion hub, or did not further engage with the feedback provided by members from the discussion hub.

![Diagram](image)

**Figure 4.** Strongly connected components within the discussion group. Different strongly connected components were marked with different colors. The size of the arrow represents the amount of interaction. And the direction of the arrow demonstrates the receiver of the feedback.

The individuals contained in these independent components were not isolated components in the discussion, they were isolated in terms of active participation, but these individuals were perhaps actively engaged in reading the posts composed by the more active members. During the interviews, both Kate, who was selected from the discussion hub and Nadia, who formed an independent
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component both reported being actively engaged in reading other members posts. Nadia responded that:

“Before I respond to any thread that are going on, I would usually look at the person who started the thread so whether it’s a professor who asked a general question, or maybe it’s our peers that posted a question. So I’ll look at the question also if there’s any response to the question, um, beforehand. I would also look at those responses. I’ll look what are some of the aspects that some people are focusing on, sometimes I know, it might not be the best but sometimes I would gage my response to theirs, so if they were looking at one aspect and I would possibly respond to that aspect, but also I feel free to offer a new aspect such as something that wasn’t necessarily mentioned.”

Kate during the break that she had to take before replying to any more posts, would usually take the time to go back and see if any newer posts were made by the other peers. She said:

“I typed my answers or my responses in Microsoft word and saved them and took about a 2 hour break and going back to see if anyone else has posted on Pepper. If they had posted and I wanted to add to my answer I would edit and then I would post it onto pepper myself.” Kate also emphasized that “If I’m replying directly to someone I would definitely read what everyone else has said before I reply.”

Nadia reported that she selectively read the posts from the discussion forum. She tended to select posts composed by specific members or posts with unique point-of-views. She said:

“there are some people in our class especially they have very unique points of view and I think it’s because they have such interesting backgrounds, and lived experiences, so I think they definitely add new insights to the discussion and I’m always looking forward
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to those...I think I definitely value everybody’s, but it’s just that some people that have these insights that I usually sit there and go, I would never thought of it that way, or like how she or he put that so eloquently.”

Nadia also selectively skimmed certain posts if the idea had reappeared several times before. She said, “...if it’s something I find really interesting, I’ll take the time to thoroughly read but if it’s something that’s been said and repeated a couple of times, I’ll just skim.”

4.2.3 The types of interaction among active members are uniform

According to Figure 5, among the active participants who scored above average (Ave = 3.25) in the number of posts they contributed, all contributed a variety of entries that served different functions in the discussion thread. At the same time, these active participants also received diverse types of feedback from other members within the community. Almost everyone in the discussion acknowledged, directly replied to and commonly interpreted other members’ posts in writing. Additionally, the majority of participants received acknowledgement, replies and interpretations of their posts from other members. There was also a good balance among types of participation each member engaged with and the types of feedback each member received.
Figure 5. Types of contribution among members within the online community. The blue boxes mark individuals who were involved in conflicts that are relevant to the discussion theme. The stop sign at the bottom marks where conflict has reached no resolution. The little sun on the top marks where there conflict has reached complete resolution or some resolution.

It is important to note that there was some evidence of consensus formation among members within the discussion community, (for example referring to Figure 5, member 1 received conflicting opinion and the member who initially posted the conflicting opinion withdrew her original opinion and provided feedback to member 1. The two members then reached consensus. However, for most members within the discussion community, there was a huge amount of opinion conflict that was not resolved with consensus formation. These unresolved opinion differences suggest an incomplete KC process according to Gunawardena’s challenge model, where the last phase of discussion was to test and summarize the shared understanding. According to the result I obtained from content analysis, there were 5 regions where discussion stopped without consensus formation and the discussion seized
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at KC phase 2 or phase 3. These results also aligned with the result from the past studies where discussion didn’t evolve to the more advanced phases according to Gunawardena’s challenge model.

4.3 Acknowledgement, Conflict and Opinion formation

4.3.1 Different types of conflict and consensus dynamics

Across the entire discussion forum of 72 entries, there were only 10 entries that contained conflicting opinions. The majority of the discussion was composed of acknowledgement, interpretation, and reply. Among all regions where there had been a conflicting opinion posted, there were only 6 occasions where participants posted the conflicting opinion as a direct response to a specific individual (Figure 6).
Figure 6. Discussion thread topology with entries marked by the thinking purposes they served. Yellow: acknowledgment, Green: interpretation, Magenta: reply with elaboration, Orange: consensus, Red: Clarification, Blue: question, Baby pink: Disagreement, Purple: Unrelated, Grey: Technical problem. The 6 occasions where participant posted the conflicting opinion as a direct response to a specific individual were contoured and marked with different letters.

From the results based on the text presented on the discussion forum, in conflict “A”, conflict was resolved in the end. It turned out that the conflicting opinion was not supposed to contradict the opinion presented in the original post. It was a misunderstanding and both participants agreed with the same idea after some clarifications.
In conflict “B”, resolution was reached. Both participants involved in this conflict agreed that there were more factors to consider in relation to the initially posted opinion. The participant who raised a conflicting opinion also agreed with the original idea. The participant who received the conflicting opinion also agreed that the conflicting opinion added another dimension to her own original contribution.

In conflict “C”, the conflicting opinion posed was not discussed with the person it was initially addressed to. However, the person who raised the conflicting opinion found common ground with two other participants. Although the settled opinion was still different from the opinion that the conflicting opinion was addressed to initially, the conflicting opinions did not completely hold either. It was compromised to another opinion different than the original post it was addressed to.

In conflict “D”, there was no resolution. The conflicting opinion was not liked by the person it was addressed to or by anyone else in the discussion forum.

In conflict “E”, there was no resolution. No one liked the conflicting opinion with the thumb up button nor was it further addressed by anyone else.

In conflict “F”, there was no resolution. The conflicting opinion was not liked by the person it was addressed to, but it was liked by two other members from the discussion forum.

Within this discussion forum, there were four types of conflict dynamics observed: conflict resolved with clarification, conflict resolved with mutual agreements, conflict resolved with compromises, and conflict left unresolved. In terms of opinion formation, conflict resolved with mutual agreement, rather than refuting any idea, the discourse dissonance added insights to both participants’ comments. In conflict B, the first participant wrote, “I agree with what you are saying to a certain
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extent....” and the second participant responded with “I really like how you're breaking this down...” and this response was once again liked by the first participant.

For conflict that resulted in compromise, more information on historical fact that was not initially known by the participant who raised the conflicting opinion was provided, and therefore the participant was inclined to change her original opinion. The participant who raised the conflicting opinion wrote, “I'm not familiar at all with the historical fact. I ask this question more for a clarification: could it be that Hitler did not personally dislike Jews but he has to create this hate toward certain group to establish his own political campaign and gain his own political power through this process?” Then another participant came in to provide the requested information and disagreed with what the previous participant suggested. She wrote, “...He certainly capitalized on anti-Semitism to gain political momentum, but when you read his writings and listen to speeches, his hatred came from a very deep, personal place - not just something he created, trumped up and exploited for political advantage. He truly believed what he was saying and what he believed would be a ‘Final Solution’.” One other participant again responded to the second participant with more follow-ups on the historical fact, “I just wanted to add to participant B’s great response. One reason why Hitler was successful in spreading his message of hate towards the Jews was that, at this time, Germany was in need of a scapegoat. People needed someone to blame for all their troubles and economic hardships rather than facing the real reasons behind the difficulties they were facing...” Finally, the first participant acknowledged both of her peers and agreed with the second participant that Hitler’s hate of the Jewish people was genuine, and not simply an act to gain political support. She posted “Thanks participant B and participant C! Very educating and participant C, agree strongly with you. People construct and use hate. Although the feeling to hate might be genuine but it is still a mental construct.
4.3.2 Acknowledgement reinforces Active Participant’s opinion formation and provokes more participation

Kate who actively participated in the discussion reported that the acknowledgment reinforced her opinion formation and consequently, encouraged more participation in class. She said that the positive feedback “was very self-affirming.” Kate also mentioned that this effect might be specific to this thread, because the topic being discussed sometimes made her “struggle with her own understanding of where she stands on issues”, and because of this, “having some positive feedback whether it’s the little likes, the little thumbs up or it was a comment that was made underneath her reply saying yes, you know what that really resonated with me”. She also mentioned that “the positive informs her opinion because it reinforces it.” She said, “I will be more likely to speak up in class if I know in an online forum, people are on my side, if I get that impression either through likes or through replies.”

Nadia who was less active in the discussion did not find having acknowledgment in the discussion acted as a reinforcer of certain opinions. Instead, she valued both positive and negative responses equally. She said, “I think I value both positive and negative,…,I don’t see it as a negative or positive, if anything, I see it as positive.”

4.3.2 Conflicting opinions usually add perspectives but do not change original belief

In this discussion thread in particular, there were not any extreme, explicit disagreements. This result was confirmed with content analysis, where disagreement was usually associated with a question and/or acknowledgement. There were only two rare occasions where a disagreement was posed on its own and the phenomenon of having only mild disagreements was also perceived by the active participant as not having received any negative feedback. Kate, when was asked about her responses to negative feedback in terms of disagreement of some of her ideas, she said, “for the negative feedback,
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um I wasn’t really, I didn’t have many responses that were negative per se. I had ones that might have disagreed.”

According to the result I got from the interviews, when individual received conflicting opinion that were either addressed toward them or something that they read and was different from what they believed, both participants mentioned that the conflicting opinion added new perspectives to their existing cognitive construct. Kate said, “It filled in some information that I think was relevant.” Additionally, Nadia said:

“I think I value both positive and negative,...,I don’t see it as a negative or positive, if anything, I see it as positive...that again, bring to my attention that all these views also exist outside, and maybe even more diverse, so I take from that...my opinion is just one, it’s not representing the majority, it’s my opinion, um I’m entitled to have my opinion, but I also actually I also acknowledge there are also other opinions, and my opinion is not the right or the most right, I think there’s something to be learned through other opinions and also to be aware and mindful of other opinions exist and I value that”

Nonetheless, both participants were reluctant to change their original opinion. This result suggested that although participants do acknowledge other perspectives, they usually view the new perspectives as an add-on to their existing belief rather than something that refute their original belief. Nadia commented:

“It doesn’t change my opinion. I think I have questioned my opinion...I don’t think I immediately change, I think it takes convincing for someone to change,...I’m more leaning toward change not very often though, I’m also very stubborn...I think there’s more to it, OK well, maybe there’s enough evidence for me to change my opinion all together, but again that will take a lot of (surprising evidences that were not
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known)...but usually, usually, it really depends on the question, I’m gathering more evidence, I’m seeing things in different ways...like this other opinion could also exist, or maybe we can have different, like we can have different actually co-exist different opinions.”

Similarly, Kate responded, “...that’s when it makes me change, maybe not change, change my perspectives yes, but also just fill it out more, if that makes sense, just build on it, and consider it, and engage with it.”

4.3.3 Individuals retained original stance if the conflicting opinion was not addressed

When participants posted conflicting opinions but did not receive any feedback, they retained their own original stance because they were not expecting an answer at the beginning. Kate reported that even when posting the conflicting opinion as a question, she was not expecting an answer. She said, “Because I know what the answer is, that one was more of a rhetorical question...I wasn’t really anticipating a response to that one, and in this thread in particular.” Most of the time the conflicting opinion did not contradict the opinion that it was addressed to, nor did the participant who posted the conflicting opinion necessarily disagree with the other member. Participants engaged in providing conflicting opinion as a facilitation method for group discussion. The purpose of the conflict entry was to try to get other members in the community to think. Kate said:

“I tried to ask questions in my responses, even if I know how I would answer them, so or I’ll post them rhetorically to get myself to think and to get others to think, so I always try, even if I’m reiterating what someone else has said to make it a little different, but not necessarily disagreeing with them but by posing other questions that could be devil’s advocate questions.”
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4.3.4 Conflict May Place the Active participants at a more vulnerable mental state in opinion formation

One interesting insight from the interview was the perceived higher stress level due to the concerns associated with the level of respect afforded in class to the active participant. Kate remarked:

“The tool option who has viewed this note on Pepper, that I found very helpful and I check a lot, I always look it up, because I’m curious who has seen the note, when they have seen it, and how often that it has been viewed, and if I find that I posted a note and it only has seen by 5 people, but I know that they are actively engaged or replying to what other people have said, I know that not only are they not replying to me but they are not even reading what I was posting, and that tells me a lot about my position and the level of respect I was afforded in the classroom with that tool. I found that interesting.”

This stress was manifested itself in a more emotional and personal way especially after receiving negative feedback from other members. This was an emotional state that the passive participants did not have to go through. Kate reported two complete opposite reactions to negative feedback. She said,

“I’ll either be very quiet and I won’t say anything in class, or I won’t continue the discussion, or the opposite will happen. I will get really defensive and try to justify myself online as best as I can, and not in an aggressive way but in way that will actually be defending my position and not changing my opinion, or and that will carry into the classroom, or I will be so worried about my reputation, that I will potentially, if the negative feedback from someone I don’t want to offend.”

This result implies that conflict may place the active participants in a more vulnerable mental state in terms of their opinion formation. In comparison to the passive participants who need not worry
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about how certain opinion would be perceived by other members, the lack of defensive mental state might provide them with the advantage of being more receptive and less biased toward their opinion formation process using ADF.

4.4 Active, Passive participation and Learning

4.4.1 ADF facilitated learning by promoting critical thinking and more reflection

The results I obtained from the interviews showed that both participants learned a lot from the ADF under study. Their responses to the issue which was originally posted by the instructor was greatly enriched at this point in comparison to their original belief. Both demonstrated their learning and gaining of perspectives around the issue by the end of the discussion. Both participants mentioned that having discussions like this promoted deeper thinking through more reflection and questioning which would not have happened otherwise. Kate said, “I wouldn't have discussed it further because to me why people hate has never been something I need to think about more and because I feel like I understand why people hate, what triggers people to hate, but I never took it to a more philosophical point.” Nadia responded, “Um, I started to question, and I think that’s good, I really think that’s good when you start to question yourself, because it shows that you’re open, you’re receptive, you’re not stuck in your ways, um you’re open to change, you progresses as a person.”

The active participant was more conscious about this process than the passive participant by voluntarily and more explicitly expressing the greater amount of critical thinking she was engaged with. Kate specifically mentioned the moment when she realized the value of having ADF in a blended learning environment. She said:

“...If we had just one class like this or even two, I probably would have left answering this question the way I entered it..., but having it online and ongoing like this allowed
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me to actually think about things more, and to see other people participate online who
may not have participated in class, and voice their opinion in such an interesting
way...even if this was a discussion in class, it wouldn’t have been teased out the same
way that it would be online, and people wouldn’t have thought about it more, cause
people wouldn’t have pushing each other to answer why and why and why.”

4.4.2 Passive participants tend to focus more on knowledge absorption rather than construction

According to the results I got from the interview, the passive participant paid more attention to
knowledge absorption whereas the active participant paid more attention to knowledge construction.
This result was demonstrated by their final answer to the issue discussed as well as their participation
throughout the discussion.

The passive participant had a specific plan as to what to read, whose entries to read and has
given out more aspects mentioned about the issue by the other members in the discussion forum in her
final response. Nadia said:

“There are some people in our class especially they have very unique points of view and
I think it’s because they have such interesting backgrounds, and lived experiences, so I
think they definitely add new insights to the discussion and I’m always looking forward
to those...I think I definitely value everybody’s, but it’s just that some people that have
these insights that I usually sit there and go, I would never thought of it that way, or like
how she or he put that so eloquently.”

She also mentioned, “...and if it’s something I find really interesting, I’ll take the time to
thoroughly read but if it’s something that’s been said and repeated a couple of times, I’ll just
skim.”
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The active participant did not pay as much attention to reviewing other people’s posts but explicitly mentioned how more critical thinking was carried out. Kate said, “I don’t typically go back and look what other people said for thread.”

Although Kate did not provide as many aspects mentioned around the issue in the discussion thread as Nadia, her critical thinking continued and enabled her to construct more novel responses to the issue even at the point of interview. She said:

“At this point, I still stand by my initial reaction...but I also think what I’m going to add to that is because, the lived experiences,...,because it’s convenient,...,a learned reaction...They might not feel that way deep down, but they hate because of the social climate there, and that goes against what I originally said in one of the post...but one of the post was people when they hate, it’s because they hate with a strong visceral response,...,not necessarily, I don’t think that people hate because they have this deep seeded passion for something, they might simply hate because they feel they have to, there might have been no passion for something,...,but then I question if it’s truly hate, or if it’s just acting. If you pretend to love someone do you love them, I would say no, if you’re pretending then you’re acting,...,and I think hate can be the same way,...,I never post that.”
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CHAPTER FIVE

5.1 Making sense of the Findings

5.1.1 Discussion Thread Dynamics over Time

The result from the discussion topology aligned well with past studies. Three types of discussion topology were found: the short thread pattern, the extended thread pattern and the split thread pattern (Chan, Hew & Cheung, 2009). Among the three patterns, it was observed that the extended thread pattern was consistent with deeper and longer lasting discussion than both the split pattern and short thread pattern. However, the breadth of discussion was enhanced by the split pattern of the discussion.

It was expected that the discussion thread would grow preferentially. Similarly to past studies, it was discovered that the students’ familiarity and interest in the topic affected the dynamics of participation (Gao, Zhang & Franklin, 2013). My results also showed that participants’ own interest, experience, and knowledge background determined participants’ selectivity as to which post to respond to. These findings aligned with past research, which found questioning as the most effective facilitation method to sustain discussion growth, and acknowledgement as the most used type of facilitation method within a discussion forum (Ling, Cheung & Hew, 2009). The result also showed that students usually question when they are posting disagreements towards their peers, and usually reiterate the other person’s opinion before acknowledging each other.

5.1.2 Participation Dynamics, Learning experience and Opinion formation

The group under the study was heterogeneous. The group demonstrated nonrandom participation and the average number of posts was relatively low. The participation distribution was skewed toward the lower number of postings. This result was similar to findings reported in the literature review where a relatively low amount of participation was observed over ADFs in general.
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As Chiya (2003) has suggested, encouragement with positive feedback lowered anxiety over making mistakes in the early stages of asynchronous discussion and effectively promoted greater participation (Jung, Kudo & Choi, 2012). The fear of offending the other members of the community affected participants’ participation dynamics. Participants were extra cautious about what to post online.

The active participant more explicitly demonstrated this emotional tension between the fear of de-individualization and the estrangement from the group (Unger, 1984). Similar to the literature, she had to distance herself from being too emotionally driven and returned to the discussion when she thought she was ready. This result was fascinatingly similar to the result obtained by Smith (2005) where participants need to alternate their participation between the active and passive mode.

The other members’ reaction toward different opinions was an essential indicator of the discussion continuation and participation dynamics. The results have demonstrated that the participants in ADF value to an extreme extent of a safe, open, and understanding online environment. The active participant was at a more vulnerable emotional state due to the fact that any less sympathetic comment would be more likely to be perceived at a personal level. Our results aligned with what was found in the literature, if members within the learning community have demonstrated through their participation that they are not easily offended and are open to feedback, all members tend to participate more in the discussion (Ling, Cheung & Hew, 2009).

Our study showed slightly different results in terms of the value of active participation. Past studies stated that members within the online community could only benefit if they actively participated in the discussion (Gao, Wang & Sun, 2009) and a heterogeneous group may hinder learning of specific learners (Rosser, 1997). However, the results suggest that both active and passive participation have merits in terms of learning. Active participation allows participants to practice and showcase their
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critical thinking skills, while passive participation allows member to gain more insights from the entries contributed by the other members.

It was also interesting that although both participants were open to different ideas, they both saw different ideas as adds-on to their existing belief. Both were very reluctant to change their own opinions. This result also aligns with literature. Given that negative feedback will tend to be perceived at a more personal level, the potential defensive mental state that the active participants have to go through may bias their opinion formation process. Overemphasis of the importance of either active or passive participation would hinder the value of the other type of participation, the overall learning experiences and the opinion formation process.

Although I have not coded the discussion thread based on Gunarnedewa’s KC phases, the discussion forum under study has demonstrated characteristics of both the challenge and connect model of KC. Within the discussion forum, participants at times have challenged each other’s perspectives and have also tried to understand and connect with each other. Similar to the literature, a low number of posts at higher KC phase were observed, and no thread reached the last phase of KC. Many conflicting opinions were left un-discussed and the discussion almost all seized before reaching phase 3 of KC process.

5.2 Implications and Suggestions

5.2.1 Balancing Thread Non-random Growth

The non-random growth of the discussion thread may result in a rich-get-richer phenomenon, where students tend to further discuss what was already well learned and what they had confidence with, or what they had an interest in. This phenomenon may leave certain important aspects of the
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discussion undiscovered and un-discussed. Both the instructor and the students should keep in mind the possible biases which inevitably come along with the knowledge construction process.

It was found from the past research and from this study that entries serving different thinking purposes may facilitate discussion continuation or terminate discussion growth. It would be good practice to assign peer facilitators to facilitate discussion growth with different facilitation techniques and the members within the group could rotate their responsibilities.

Our result once again confirmed the importance of building personal connections among all members within the learning community. It would be wise to collectively construct safe online practice rules and explicitly state them online. Both the instructor and the students should constantly remind each other of good online practices and sustain a safe online environment. Each participant in the discussion should always keep these rules of conduct in mind and adhere to them the best they can.

5.2.2 Being Cautious of one type of Participation among members

We did see the value of active participation for fostering critical thinking. No contribution to the entire discussion thread would be made without members actively participating in the discussion. But members while actively participating should also keep in mind the potential disadvantages they may have to face at the time of participation and upon the receipt of feedback. Active participants should be made aware that active participation may use up the majority of their time available to compose their own responses and cause them to pay less attention to the existing opinions contributed by the other members. Active participation may also place an individual at a more emotionally vulnerable state to different and especially conflicting opinions. It would be great for active participant to occasionally distant themselves from the discussion thread and take time to reflect and read others’ comments.
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Although the passive participant reiterated more aspects from the discussion thread, one should not ignore the value of practicing critical thinking skills in more explicit ways. I think it would be great for instructor to explicitly state the goal and the assessment criteria of an online discussion thread, so that each member would have a clearer goal as to what demonstrates a deeper, richer online discussion and how the group could learn and progress together.

5.3 Limitations

This study has many shortcomings. The case study is very restricted to its context, the specific group studied and the specific topic discussed. Although the result may be transferable to other situations, we may expect a range of different learning dynamics in other groups. The low number of participants I interviewed could also bias the result toward specific learning habits and motives. And since I was the only person who coded the discussion thread, it is inevitable that I have introduced my own bias and perception into the coding process. The result might have been slightly different if another researcher were to code the same thread. One other limitation was that the number of contributions made by each individual in this study was measured by the number of posts. But each post may contain very different number of words. Certain entries might contain many paragraphs while some others may just consist of a sentence. It is sometimes inaccurate to assume that having more posts implies greater amount of participation. Also, a creative entry may indicate higher level of participation in comparison to a post that simply reiterates previous ideas. These limitations may in turn interfere with the result we got on the group and individual participation dynamics for this research.

5.4 Future study

There are many possible future directions for this study. For instance, we could conduct the same case study with more coders to control for the coding discrepancy. We could recruit more participants from the learning community and gain a broader perspective as to individuals’ experiences.
with this particular thread. Also, we could study the same group with other topics delete to see if group characteristics could be found among different discussion forums. Moreover, if this topic were to be discussed again by another group, it would be interesting to see how different groups would respond and carry out the same task similarly and differently.

One finding that I thought was interesting was how reluctant the participants were toward changing their opinions. This may be due to the fact that the topic being discussed in this particular thread was very open and biased toward personal experience and perception. There was not likely a defined answer, let alone a right or wrong answer. Because it was such a topic, it would be interesting to see if the instructor’s intervention could have greater effects in individual opinion formation. One finding from the literature review was that the individual thinks the knowledge constructed using online discussion has less validity due to the limited credentials each individual has in comparison to the in-class instruction given by a certified educator.

It would also be interesting to study the KC phases within this discussion forum by coding the discussion thread based on Gunarwadena’s KC phases and see how far in depth the discussion went. It would be interesting to find facilitation techniques that could help members to sustain a long lasting in-depth conversation. The results could possibly inform the development of guidelines for a richer and more in-depth discussion.

5.6 Conclusion

The conclusion of our study has found that the discussion thread preferentially grew based on students’ facilitation methodology, interests and knowledge background. We identified that homogeneous participation in ADFs might hinder one’s learning experience and opinion formation. It is better to make both the instructor and the students aware of the potential risks of having homogeneous participation and encourage both a richer and deeper discussion as well as attentive reading and
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constant reflections. Having a safe online discussion environment is a prerequisite to have productive learning experiences online. Both the students and the teachers should be made aware of the safe space guidelines as well as the potential risks associated with online participation.
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APPENDIX A

The adjacency matrix of participation. Each row and column represents an individual. The number in the second role and third column indicate the amount of participation initiated by the second individual to the third individual.

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### Knowledge Construction via Asynchronous Discussion Forums

**APPENDIX B**

Table XIV from Weltzer-Ward (2010)

<table>
<thead>
<tr>
<th>Code</th>
<th>Unit(s) of analysis</th>
<th>Code type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synthesis coding list for nature of statement in thinking purpose category</td>
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<td></td>
</tr>
<tr>
<td>Question: information seeking</td>
<td>Statement</td>
<td>Exclusive choice</td>
</tr>
<tr>
<td>Question: discussion or open</td>
<td></td>
<td></td>
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<tr>
<td>Question: reflective</td>
<td></td>
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<tr>
<td>Reply: direct information</td>
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<tr>
<td>•</td>
<td></td>
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<tr>
<td>Reply: elaboration</td>
<td></td>
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<tr>
<td>Clarification: clarify problem</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clarification: present idea</td>
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<td></td>
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<tr>
<td>Clarification: explain idea</td>
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<tr>
<td>Clarification: judge idea</td>
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<tr>
<td>Interpretation: draw conclusion</td>
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<tr>
<td>Interpretation: make prediction/hypothesis</td>
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<tr>
<td>Interpretation: summarize</td>
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<tr>
<td>Interpretation: propose solution</td>
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<tr>
<td>Interpretation: relate to other situations</td>
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<tr>
<td>Conflict: present alternative</td>
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<tr>
<td>Conflict: disagreement</td>
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<tr>
<td>Conflict: personal friction</td>
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<tr>
<td>Assertion: restating idea</td>
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<tr>
<td>Assertion: defending an argument</td>
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<tr>
<td>Consensus: negotiating</td>
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<tr>
<td>Consensus: clarifying misunderstanding</td>
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<tr>
<td>Consensus: proposing compromise solution</td>
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<tr>
<td>Consensus: agreeing to disagree</td>
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<tr>
<td>Consensus: initiating action</td>
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<tr>
<td>Judgment: judging relevance</td>
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<tr>
<td>Judgment: judging value</td>
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<tr>
<td>Judgment: judging accuracy</td>
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<tr>
<td>Reflection: assessment of learning</td>
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<tr>
<td>Reflection: assessment of importance</td>
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<tr>
<td>Support: acknowledging others</td>
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<tr>
<td>Support: showing empathy</td>
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<td></td>
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<tr>
<td>Support: giving feedback</td>
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</tr>
</tbody>
</table>
Knowledge Construction via Asynchronous Discussion Forums

APPENDIX C Semi-structured Interview Procedure

Interviewee

Kate Rogers: This participant has been actively engaged in this discussion. She belongs to the discussion hub according to the result obtained from SNA. She was engaged in posing and receiving conflicting opinions. She has reached written consensus with other members from the community, but was also engaged in discussion where her conflicting opinion was not further addressed.

Nadia Stone: This participant was not as active in the discussion forum verbally, but she has been actively reading all the threads posted by other members of the community.

Interview Questions

1. Would you describe your experience before you reply to the discussion thread (How would you use the discussion thread, your choice of replying to certain idea, are there anything you pay particular attention to? Are there anything you don’t read)?

2. Would you describe your experience after you contributed to the discussion (Do you come back and check, how often do you check, do you check everything newly added to the thread? or do you check specific entries, are there anything that you do not read)?

3. What are your reactions to positive and negative feedback? (How do you think they affected your original opinion and final opinion formation)?

   Have the interviewee reread what was written and ask her about her reaction and opinion (Active participant only)

4. What are your experiences with (Conflict C where consensus formed, and Conflict D where consensus didn’t form)?

5. What are the conditions that promote learning?

6. Overall, why do you think people hate? (I’ll have the interviewee reread the thread?)

   (I would like to see if the interpretation of the discussion thread would differ between active and passive participants)
APPENDIX D LETTER OF CONSENT

Dear ________________

This is a letter inviting you to participate in a research project regarding your experience as a learner using the asynchronous discussion forum hosted by Pepper. My name is Cynthia Shi, and I am a Master of Teaching student at the Ontario Institute for Studies in Education of the University of Toronto (OISE/UT). As part of my Masters of Teaching research paper, I will be exploring how knowledge is constructed over this new learning platform.

Your participation in this study would include a 20 to 25 min, audio-taped interview. The interview includes questions regarding your experiences with asynchronous E-learning, specifically your experiences with the online asynchronous discussion forums on Pepper.

The audio recordings of the interview will be transcribed and analyzed. Your responses and your identity will be kept confidential and anonymous. During the course of this research, only my supervisor and I will have access to the data. Please be assured that your participation in this research project is completely voluntary. You may refuse to answer any question at any time during the interview. You can stop the interview or withdraw from the study at any time for any reason. The information gained from this study will help us gain information regarding the role and impact of asynchronous discussion forum in the knowledge construction process. Should you have any questions or require further information, please feel free to contact either myself or my faculty supervisor.

If you agree to participate, please sign the attached form in preparation for the interview. The form can be submitted at the interview, or scanned and emailed to xiaowen.shi@mail.utoronto.ca please keep a copy of this letter for your record. We thank you for your participation and contribution to this research study.

Sincerely,

Cynthia (Xiaowen) Shi
5146798818
Principle Investigator

Jim Hewitt
Supervisor

_________________________
_________________________
Knowledge Construction via Asynchronous Discussion Forums

My name is __________________ I understand and am willing to participate in Cynthia Shi’s research on the dynamics of online asynchronous discussion forum.

I understand that my participation is completely voluntary.  Yes_____ or No_______

I am free to refuse answering any questions during the interview.  Yes_____ or No_______

I am free to withdraw at any time.  Yes_____ or No_______

Participant’s name in printing ________________________________

Participant’s signature: ____________________________________________

Date: ______________________________