# Growth patterns and E-Moderating Supports in Asynchronous Online Discussions in an Undergraduate Blended Course

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## Abstract

This study presents a case study of asynchronous online discussions' (AOD) growth patterns in an undergraduate blended course to address the gap in our current understanding of how threads are developed in peer-moderated AODs. Building on a taxonomy of thread pattern proposed by Chan, Hew and Cheung (2009), growth patterns of thirty-six forums were explored on three patterns: Short Thread Pattern (SHTP), Extended Thread Pattern (ETP), and Split Thread Pattern (STP). The impact of peer moderating supports on thread growth was also investigated. Types of peer moderators' supports were explored utilizing a coding scheme from Smet, Keer, Wever, and Valcke's (2010) study. STP pattern was found to be more common than the other patterns with 74 (37.94%) out of 195 threaded discussions growing on it. The results also showed that, compared to SHTP, in both STP and ETP the occurrences of 'Information exchange' and 'Knowledge construction' supports appeared to be more, while the presences of supports stimulating 'Development', 'Access and motivation' and 'Socialization' were less. Furthermore, the use of 'Access and motivation' and 'Socialization' supports appeared to enhance early thread termination when used individually. Thread continuity was reinforced by the use of 'Knowledge construction' support with other moderating supports.

*Keywords:* Threaded discussions, AOD, thread development, e-moderating, patterns of growth

## Introduction

In both fully online and blended courses, discussion forums, being asynchronous tools, are acknowledged for the chances they afford for construction of collaborative learning, self-regulated learning and promoting reflective and thoughtful content in the discussion (Wong & Bakar, 2009). This paper extends previous studies on AODs by focusing on the interplay of peer-moderating behaviour with growth of AODs. Thread growth has been chosen for this study due to the relation between AOD thread development and social constructivism theory (Hewitt, 2005).

Social constructivists, such as Vygotsky (1978), proved that learners do not learn in isolation. He believed that learning takes place on two levels of interaction. First, through interaction with others and on the social level (interpsychological), and then on the individual level (intrapsychological). For both levels of learning to take place, initial writing and engagement with the posts contributed by others should ideally be the norm. In other words, sustained online discussions, being characterized as long AOD threads, are central for students' interpsychological and intrapsychological learning because they typically contain several exchanges of notes or postings for learners to voice their opinions, analyze peers' comments, explore different perspectives, negotiate issues, reflect on their learning and construct shared understandings (Guzdial & Turns, 2000; Hewitt, 2005). Moreover, examining the growth of AODs can provide a way to see if conversational exchanges are happening among members (Dennen, 2005), and if so, through the application of which kinds of peer supports. As moderators, learners may play four independent roles: social, intellectual/pedagogical, technical, and managerial (Gairín-Sallán, Rodríguez-Gómez, & Armengol-Asparó, 2010). Novice peer moderators (PM) are more likely to use social (e.g., encouraging participation) and intellectual (e.g., summarizing) roles (Hew & Cheung, 2011). However, salient support or behavior that PMs use to enhance thread development has not being addressed in prior research. Three research questions guided this study:

1.   What different patterns of growth are exhibited in peer-moderated AOD threads?

2.   How do contributions of PMs in each kind of thread patterns differ with regard to practice of e-moderating supports?

3.   Which kind of e-moderating support encourages thread continuity or thread discontinuity?

Since the usage of AODs has become widespread in educational contexts, investigating and understanding the impact of moderation support becomes dramatically critical. In this article we present awareness for prospective PMs of AODs on the practice of different types of moderation supports to reduce the risk of early thread termination and sustain growth of threaded discussions.

# Literature Review

## Patterns of Threaded Discussions

The word thread is defined as "a collection of written messages or notes that AOD participants have linked

together" (Chan et al., 2009, p.441). Basically, a starter note (the note or post that initiates the thread) is written and following that responses are linked to the starter note and to other responses. An AOD can contain several threads with a chain of responses. In AODs, responses can be either of 'extended note' or 'split note'. Extended notes follow the preceding note, while split notes emanate from a preceding note. Examples of extended and split notes are presented in Figure 1.
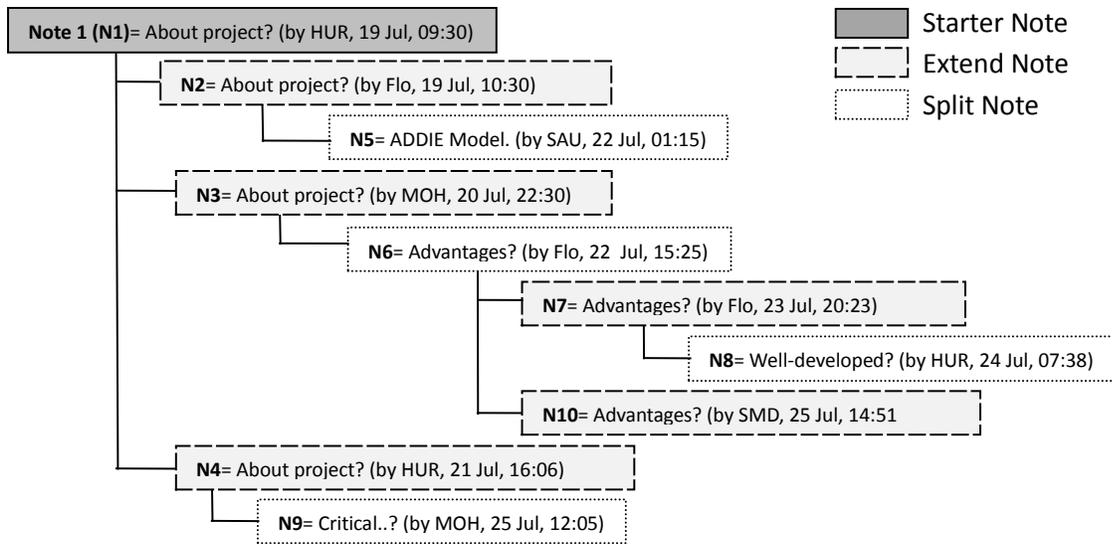


*Figure 1*. Example of a thread with different types of notes.

To ground this work conceptually the patterns of threaded discussions are considered based on a taxonomy of thread patterns proposed by Chan et al. (2009). This serves the purpose of testing the applicability of the framework in the context of undergraduate peer-moderated AODs. Chan et al.'s (2009) taxonomy describes three kinds of thread growth emerging from written views of the discussion environment (see Figure 2). This conceptualization is useful because of its grounding in learning theory and its consideration that threads' growth may evolve over time.
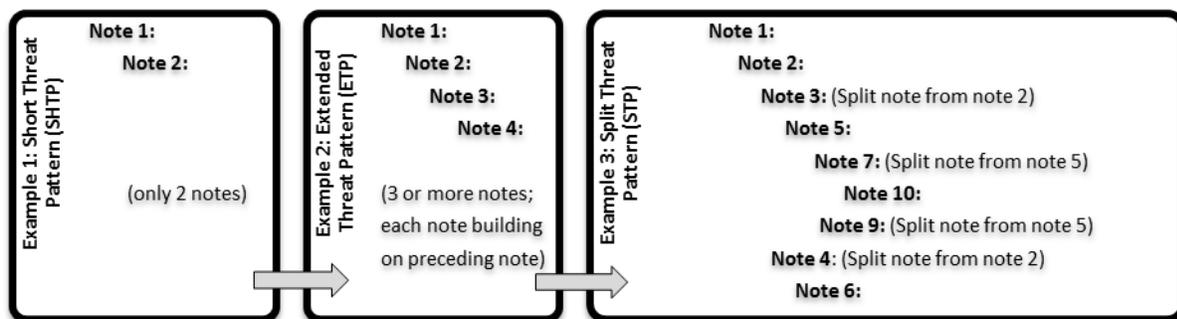


*Figure 2*. Overview of Chan et al.'s (2009) taxonomy for thread pattern.

The most basic type of growth pattern of a thread in Chan et al.'s (2009) model is SHTP (see Figure 2, Example 1). In this pattern formation, the starter note is posted by a learner and an extended note is builds upon preceding starter note. This growth pattern of the thread shows limited 'depth' and is indicative that an effective discussion is not happening because it would not proceed beyond the second note. Effective discussion refers to one that is sustained (Guzdial & Turns, 2000). Moving up to the next pattern of thread, 'depth' is increased and students respond in an orderly fashion to preceding messages, as well as placing value on 'ground rules' (like one post per discussion). This pattern of thread growth is called ETP, which have three or more extended notes preceding each other in a systematic order (see Example 2). The term ETP and 'Elongated Thread Structure' are terms used interchangeably in the literature (Hewitt, 2003). The existence of ETP is indicative that a sustained discussion is taking place containing one issue or idea within a specific discussion topic. In the third thread pattern, referred to as an STP (see Example 3), two or more notes (split notes) are generated from a starter note, with each split note involving a different issue or viewpoint and creating a different subthread. The existence of STP suggests that students are involved in a sustained discussion that has two or more ideas. Each idea (split note) may produce their own chain of responses being structured in any number of ways as the threaded discussions grow. Since split notes and extended notes are interwoven together in a random manner, there is no uniform STP. From these examples, it is perceived that with the existence of one viewpoint to be discussed in AODs an ETP would be formed, while the existence of two or more ideas results in STP configuration (Chan et al., 2009).

## Contributing Factors Affecting Thread Development

As mentioned previously, from a social constructivism theory, learning in AODs takes place when sustained online discussions exist (Ng, Cheung, & Hew, 2009). Unfortunately, lack of students' participation in terms of posting messages is a prevalent problem (Hew, Cheung, & Ng, 2008). For instance, Cheung and Hew (2006) proposed that learners seldom answer their peers' questions and extend the discussion. Prior studies suggested that to have a sustained thread, it should be six or more levels deep (Hew & Cheung, 2008). However, many AODs do not achieve this criterion (Guzdial, 1997; Hewitt & Teplovs, 1999).

Of the key factors associated with growth of AODs, computer-conferencing interface, design of the discussion topic, facilitation techniques, and behavior of other participants in the AODs are usually highlighted more. First, Hewitt (2005) analysed patterns of growth in asynchronous computer conferences and suggested that in computer conferencing, the main focus of students is on the recent postings and less on the old messages. To overcome this deficiency, Hewitt (2003) suggested that stressing older threads by a moderator or students can direct learners' attention to these postings and help in their recall.

Second, Guzdial and Turns (2000) suggested that to have sustained AODs, discussion topics must be found worthy by students and be related to the class learning objectives and goals (a construct similar to task value) (Wigfield & Eccles, 1992). Likewise, Schellens, Van Keer, Valcke, and De Wever (2007) suggested that task characteristic should be connected with zone of proximal development (ZPD) of the

students.

A third barrier to thread development in AODs may result from the participants' behaviour. Basically, failure in receiving an immediate response from other members can cause a decrease in students' participation (Cheung & Hew, 2004; Jeong, 2004). Procrastination, referring to a delay in responding to others, is a widespread problem in AODs (Michinov, Brunot, Le Bohec, Juhel, & Delaval, 2011). Furthermore, premature termination of threads happens when students feel that they are being insulted or threatened (e.g., personal attacks that are a similar construct to lack of psychological safety) (Zhang, Fang, Wei, & Chen, 2010) by other individuals in the AODs (Murphy & Coleman, 2004). Lack of commitment is the other factor affecting early thread termination that is addressed by role assignment strategy (Strijbos & De Laat, 2010).

Fourth, facilitation technique may influence the growth of threads in AODs. Facilitation technique is further divided into two dimensions, which are human facilitation and computer facilitation. Examples of computer facilitation are scaffolding small group discussions through computer-based peer-questioning strategy (Choi, Land, & Turgeon, 2005) and utilizing adaptive feedback in the form of group awareness (Suh, 2011). Regarding human facilitation, one critical school of research concentrates on the role of instructors. Basically, tutors utilize various interventions and supports to sustain thread development of AODs. For instance, responding promptly to students' postings (Dennen, 2005), posing worthy questions to the students (Masters & Oberprieler, 2004), and providing step-by-step guidelines to online group discussion members (Weed, Spurlock, & Forehand, 2014). However, too much presence from the side of a tutor can oppress certain students and ideas (Mazzolini & Maddison, 2003) and incurs the risk of early and premature thread termination.

The last factor that shapes development of threads is learner characteristics. Students with a lower degree of intrinsic motivation (i.e., perceived value, autonomy, competence and relatedness) may not meet their expectations for participation in AODs (Xie, 2013; Xie & Ke, 2011). With regards to self-efficacy, students who do not believe in their knowledge self-efficacy about the topic or subject participate less frequently in AODs compared to students with higher knowledge self-efficacy (Chen, Chen, & Kinshuk, 2009) and cause early thread termination. In summary, factors influencing thread growth fall into three distinct categories: individual-level, group-level, and contextual-level constructs that are illustrated in Table 1.

Table 1

*Factors Influencing Thread Growth*

| Categories | Variables | Sources |
|---|---|---|
| Contextual-level | Constant presence of teachers | Mazzolini and Maddison (2003) |
| | Task characteristics | Schellens and Valcke (2006) |
| | Computer conferencing interface | Hewitt (2005) |

| | | |
|---|---|---|
| | Procrastination (delay in response) | Cheung and Hew (2004) |
| Group-level | Lack of psychological safety | Hewitt (2005) |
| | Lack of commitment | Strijbos and De Laat (2010) |
| Individual-level | Lack of Intrinsic motivations | Xie and Ke (2011) |
| | Lack of Knowledge self-efficacy | Chen et al. (2009) |

Although the above mentioned factors have been shown to influence growth of threads, few studies have examined the effect of peer moderation supports in shaping the development of AODs threads. Moreover, existing studies on student moderation are limited in two ways. First, much of the prior studies that investigated peer moderation supports in AODs were mostly conducted in Western countries (De Smet, Van Keer, & Valcke, 2008; De Smet, Van Keer, & Valcke, 2009). Second, although Chan et al. (2009) specified four types of peer facilitation supports in growth development of AODs involving Asian participants, their study was conducted among graduate students. More specifically, AODs thread development among undergraduate PMs, and how their e-moderation behaviours may shape the growth of AODs have not been investigated. Expanding on Chan et al.'s (2009) study, suggesting that more research is needed to examine the trend of thread development based on facilitation techniques enacted by experienced facilitators in cases other than post-graduate students (e.g., undergraduate students), the impetus is greater than ever, particularly as AODs are being augmented with peer-learning and student-cantered learning strategies. This paper undertakes such examinations through analysis of the patterns of AOD threads as well as the practice of Asian undergraduate students' moderation supports in shaping thread development of AODs (continuity and discontinuity) in an online blended course.

# Method

## Participants

The current study was conducted in an undergraduate level blended course at UPM University, Malaysia, involving 84 sixth-year Educational Science students: 19 (22.62%) males and 65 (77.38%) females. The age of participants ranged from 29 to 51 years old. Among the participants, 90.48% (n=76) of participants were Malaysian, followed by 3.57% (n=3) Chinese, 3.57% (n=3) Indian, and 2.38% (n=2) others. Students reported having high (52.38%) and moderate confidence (45.24%) levels in the usage of technology to complete the coursework. This eleven-week course was offered during the fall 2014 semester delivered using the LMS of the target University (PutraLMS).

## Procedure

In the first session of the course which was held on-campus, the instructor clearly explained to students the course objectives, the aim of the discussions, evaluation criteria (rubric), features of PutraLMS (the

platform of the targeted university). Moreover, permission to include students in this study was attained through participant informed consent forms. Eighty-four students who agreed to participate were divided at random into 12 groups of seven students. This size of group was deemed adequate as suggested by Collison, Elbaum, Haavind, and Tinker's (2000) study. During the semester, students participated in seven weekly discussions within their appointed groups, which accounted for 20% of their final course grade. Each week an online discussion forum for each group was completely moderated by a randomly assigned student. All activities of online discussion in the course were recorded in PutraLMS system where the instructor created empty forums at the beginning of the semester.

The PM role was scripted and modelled by providing two guidelines instructing learners on how to perform the role's duties. The first guideline was based on the the six-step approach of De Wever, Van Keer, Schellens, and Valcke's (2010) peer tutor training; the other was based on the five-step e-moderation model of Salmon (2000) as well as a set of sample sentences based on a large body of literature (De Smet et al., 2008; Hew & Cheung, 2008; Smet, Keer, Wever, & Valcke, 2010). Two kinds of evaluation were carried out to assess the content and face validity of the two functional guidelines: (a) subject matter experts and (b) pilot test. One week before the onset of each week's online discussion, students who were randomly assigned as PM received an email attached with a discussion topic and two validated functional guidelines, the same for all assigned PMs of the same week. Discussion topics were similar in level of complexity.

## Data Collection

Using a case study approach the main aim of this study was to gain a deeper understanding of growth pattern of AOD threads and how thread development and configuration is related to the practice of PMs' supports. The study relies on analysis of both qualitative and quantitative data. To begin with, of the 84 forums, 36 forums with the higher frequency of participation postings were chosen. As the mean number of posting per student for the class was 26.09, only those forums with more or the same number of postings were chosen and their structures were investigated. The more frequent forums were chosen for this study because it is believed that such forums shows growth pattern of discussion better than less frequent forums with few postings.

## Quantitative Analysis

In the first step, students' participation in discussions in terms of the number of notes was examined. Participation in AODs consists of two main actions: writing and reading (Lipponen, Rahikainen, Lallimo, & Hakkarainen, 2003); however, writing notes "is closely tied with discussion, and can subsume reading" (Guzdial & Turns, 2000, p. 440). Using the same procedure used in the study conducted by Chan et al. (2009), discussions were mapped out. First, based on the chronological order, each written note was given a numerical value. Second, each note was labeled as 'extended note' or 'split note'. Finally, types of thread patterns were assigned to each thread.

## Qualitative Analysis

The peer moderators' discussion transcripts were downloaded from the discussion platform and copied into separated Word documents to be analyzed through content analysis technique. We used coding from Smet et al.'s (2010) study which is adapted from the five-step model of Salmon (2000). Specifically, the coding scheme consists of five main peer moderating behaviors and seventeen indicators. For the purpose of this study the choice of unit of analysis follows the approach of Henri's (1991) model, which suggests 'unit of meaning' in a message as a unit of analysis. This approach is chosen because: (a) moderating is a multidimensional activity, and (b) contributions of PMs can reflect varied categories within a single message (Smet et al., 2010). Therefore, by this way of codification, multiple codes were applied to one posting. Table 2 depicts the major indicators of the coding scheme framework, and provides representative examples from the raw data to show that each process is supported by data from the participants.

Table 2

*Coding Scheme for Analysis of Peer Moderators' Discussion Content (Smet et al., 2010)*

| **Category** | **Indicator** | **Examples** |
|---|---|---|
| Access and motivation | Clarifying the peer moderator role | Hi, I am your leader to manage whatever happens this week. |
| | Being accessible to computer-related problems | By clicking on 'topic' you will be able to add more and edit your thoughts. |
| | Encouraging participation | Come on everyone! Send messages. There isn't something to be afraid off. |
| Socialization | Informal conversation | Inshalla all of us to be succeed. |
| | Expression of appreciation | Thanks for your comments. I found it very useful. |
| | Showing commitment | Sincerely, if anyone still can't see it they can contact me. |
| Information exchange | Modelling the contents by expressing personal beliefs or value | Even social loafing is new to me, the terms 'social loafing is defining...... |
| | Bringing in other content information | Please download the attached file and look page 23 for further explanation. |
| | Organizational management and planning | I contacted Prof. and he recommended to be planned as we only have two weeks left to finish discussion. Please only discuss the first stage of the ADDIE model. |
| | Breaking down the learning task | The model need to be discussed |

| | | separately as Prof. mentioned |
|---|---|---|
| | Explaining the learning task | By providing PowerPoint Prof. wants everyone to present. |
| Knowledge construction | Asking for content explanation and clarification | Can you clarify what you mean exactly? |
| | Asking to summarize | So far the contributions seem to be focussing on….but can someone else make a conclusion of given ideas? |
| | Giving feedback about learning and social processes to both the individuals and the group | All of you did great, but to add extra to your point, C's need to give an example. |
| Development | Call for further reflection | If we want to use too much text so what would be about cognitive-load theory? |
| | Elaboration. This is a type of communication that invites students to put earlier ideas in another or new context. | Imagine we want to use this product in contexts other than primary schools, what will be critical to be considered? |
| | Playing devil's advocate. For example, positing 'what if' questions | What if we add use two theory together? |

In order to specify the consistency of the content analysis, in addition to the researcher, two independent coders were trained to codify the entire moderators' posting, independently. An acceptable Cohen's Kappa (0.75) was calculated. Neuendorf (2002) pointed that in cases that Cohen's kappa is utilized, the value between 0.40 and 0.75 indicate fair to good agreement beyond chance.

# Results and Discussion

*RQ1: What different patterns of growth are exhibited in peer-moderated AOD threads?*

As shown in Table 3, among 195 threads found in 36 AOD forums, 74 threads took on STP (37.94%) with deep structure, 46 threads took on ETP (23.58%) with prolonged structures, 36 threads undertook STP (18.46%), and 39 threads admitted no structure (20.00%) and were classified in the 'Others' category. In the 'Others' category, the starter note did not receive any response from the other participants.

Table 3

*Relative Frequency of Occurrences for Three Different Thread Patterns*

| Patterns of AOD threads | Numbers of incidence in thirty six AOD forums |
|---|---|
| Split Thread Pattern (STP) | 74 (37.94%) |
| Extended Thread Pattern (ETP) | 46 (23.58%) |
| Short Thread Pattern (STP) | 36 (18.46%) |
| Others * | 39 (20.00%) |
| | Total No. of threads = 195 |

* The thread including starter note with no response replied to it.

*RQ2: How do contributions of PMs in each kind of thread pattern differ with regard to practice of e-moderating supports?*

Before answering this question, we try to find out whether the number of PMs' postings affected participants' intention to contribute more in AODs. Hence, for each AOD forum, the number of postings by the PM and the number of postings by other participants were checked. As shown in Table 4, the percentage of PMs' participation to total group participation varied between 8.57% and 52.85%. On the whole, PMs' postings did not necessarily have the effect on attracting more participation from the side of group members in AOD forums. For example, in Group 4, moderator D posted 4 messages only; however, these posts generated participation of all six members with 36 postings. In other words, it appears that in AODs the relationship between moderator's frequency of postings and group participation is conditioned by the types of peer moderating supports enacted.

Table 4

*Frequency of Messages per AOD Posted By Peer Moderator and Other Participants*

| Postings by peer-moderators per AOD | | Postings by other participants per AOD | | | | | | | Total postings per AOD |
|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F | G | |
| Group 1 | Moderator B - 11 (22.44%) | 5 | - | 9 | 6 | 7 | 6 | 5 | 11 + 38 = 49 |
| | Moderator C - 12 (42.85%) | 1 | 1 | - | 2 | 0 | 6 | 6 | 12 + 16 = 28 |
| Group 2 | Moderator A - 3 (8.57%) | - | 8 | 4 | 7 | 8 | 3 | 2 | 3 + 32 = 35 |
| | Moderator B - 14 (21.87%) | 7 | - | 8 | 10 | 12 | 9 | 4 | 14 + 50 = 64 |
| | Moderator D – 8 (27.58%) | 3 | 2 | 4 | - | 5 | 5 | 2 | 8 + 21 = 29 |
| | Moderator E – 9 | 5 | 6 | 5 | 10 | - | 11 | 4 | 9 + 41 = 50 |

| Group | Moderator | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | (18.00%) | | | | | | | | |
| Group 3 | Moderator A – 23 (41.81%) | - | 6 | 2 | 6 | 9 | 6 | 3 | 23 + 32 = 55 |
| | Moderator B – 8 (22.22%) | 15 | - | 1 | 1 | 3 | 7 | 1 | 8 + 28 = 36 |
| | Moderator E – 3 (11.53%) | 4 | 7 | 1 | 1 | - | 8 | 2 | 3 + 23 = 26 |
| Group 4 | Moderator A – 6 (18.18%) | - | 4 | 4 | 7 | 7 | 0 | 5 | 6 + 27 = 33 |
| | Moderator B – 13 (22.80%) | 8 | - | 4 | 9 | 9 | 7 | 7 | 13 + 44 = 57 |
| | Moderator C – 14 (28.57%) | 6 | 5 | - | 7 | 10 | 3 | 4 | 14 + 35 = 49 |
| | Moderator D – 4 (11.11%) | 7 | 6 | 6 | - | 10 | 1 | 2 | 4 + 32 = 36 |
| | Moderator G – 12 (33.33%) | 4 | 1 | 5 | 4 | 9 | 1 | - | 12 + 24 = 36 |
| Group 5 | Moderator B – 37 (52.85%) | 5 | - | 7 | 4 | 4 | 6 | 7 | 37 + 33 = 70 |
| | Moderator C – 9 (34.61%) | 1 | 11 | - | 2 | 2 | 1 | 0 | 9 + 17 = 26 |
| | Moderator D – 11 (24.44%) | 4 | 16 | 2 | 3 | - | 5 | 4 | 11 + 34 = 45 |
| Group 6 | Moderator A – 5 (15.62%) | - | 4 | 8 | 9 | 0 | 3 | 3 | 5 + 27 = 32 |
| | Moderator D – 9 (27.27%) | 5 | 2 | 5 | - | 2 | 5 | 5 | 9 + 24 = 33 |
| Group 7 | Moderator B – 27 (47.36%) | 3 | - | 8 | 8 | 5 | 3 | 3 | 27 + 30 = 57 |
| | Moderator D – 4 (13.33%) | 4 | 3 | 9 | - | 5 | 2 | 3 | 4 + 26 = 30 |
| Group 8 | Moderator A – 14 (25.92%) | - | 6 | 16 | 6 | 4 | 5 | 3 | 14 + 40 = 54 |
| | Moderator B – 21 (23.59%) | 8 | - | 21 | 8 | 11 | 15 | 5 | 21 + 68 = 89 |
| | Moderator C – 36 (43.90%) | 6 | 7 | - | 5 | 10 | 7 | 11 | 36 + 46 = 82 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Moderator D – 7 (21.21%) | 3 | 4 | 12 | - | 2 | 2 | 3 | 7 + 26 = 33 |
| | Moderator E – 8 (27.58%) | 2 | 2 | 11 | 3 | - | 1 | 2 | 8 + 21 = 29 |
| | Moderator F – 21 (27.27%) | 5 | 7 | 22 | 9 | 9 | - | 4 | 21 + 56 = 77 |
| | Moderator G – 7 (25.92%) | 2 | 4 | 9 | 4 | 1 | 0 | - | 7 + 20 = 27 |
| Group 9 | Moderator A – 5 (19.23%) | - | 5 | 5 | 2 | 7 | 2 | 0 | 5 + 11 = 26 |
| | Moderator C – 6 (17.14%) | 2 | 6 | - | 5 | 7 | 6 | 3 | 6 + 29 = 35 |
| | Moderator E – 6 (21.42%) | 1 | 5 | 4 | 6 | - | 5 | 1 | 6 + 22 = 28 |
| Group 10 | Moderator C – 10 (31.25%) | 2 | 4 | - | 3 | 4 | 4 | 5 | 10 + 12 = 32 |
| | Moderator E – 7 (26.92%) | 3 | 4 | 4 | 2 | - | 2 | 4 | 7 + 19 = 26 |
| Group 11 | Moderator C – 10 (23.80%) | 3 | 4 | - | 6 | 3 | 9 | 7 | 10 + 32 = 42 |
| Group 12 | Moderator D – 8 (28.57%) | 3 | 5 | 2 | - | 3 | 2 | 5 | 8 + 20 = 28 |
| | Moderator E – 8 (20.51%) | 5 | 3 | 6 | 9 | - | 5 | 3 | 8 + 31 = 39 |
| Total number of postings | | | | | | | | | 1523 |

Figure 3 displays the percentages of the occurrence of five levels of e-moderating behaviors enacted by PMs of 36 AODs per thread patterns. In this part, the 'Other' category is not included because no message was found to be sent by PMs within this category. In total, sixth-year students acting in the role of PM posted 416 messages in which the coders yielded a total of 702 counts of units of meaning: 370 (52.70%) units resulting from STP, 181 (25.78%) units from ETP, and 139 (19.37%) units from SHTP. As can be derived from Figure 3, the overall pattern of e-moderating is not similar in different thread patterns. Generally, PMs predominantly give students supports focusing on 'Information exchange' (35.79%), followed by support invoking 'Knowledge construction' (28.11%) and 'Socialization' (21.15%) which were enacted 247, 194, and 146 times, respectively.
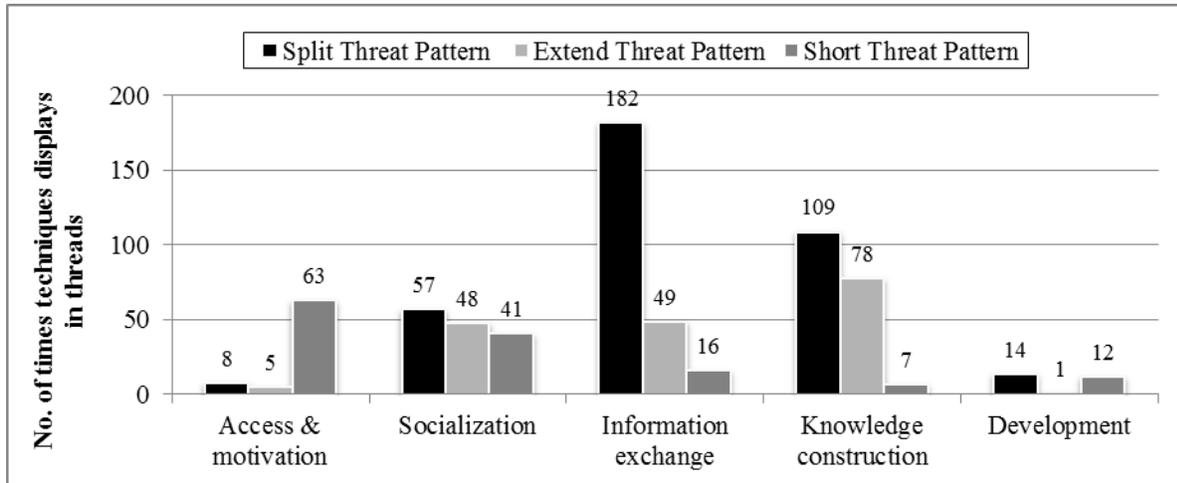
*Figure 3*. Percentages of the occurrence of the five levels of e-moderating support per thread patterns.

More specifically, the descriptive results show that the occurrences of 'Access and motivation' behavior in SHTP is 7.87 and 12.60 times more compared to STP and ETP, respectively. STP is associated with 1.18 and 1.39 times higher occurrences for 'Socialization' facilitating support than the ETP and SHTP, respectively. PMs in the STP stimulate 'Information exchange' support and to a somewhat higher extent at 3.71 times and 11.37 times more than the ETP and SHTP, respectively. Compared to STP and ETP, in SHTP the 'Personal development' support was lower and was used only 7 times. Further, it appears that PMs in STP (14 times) and SHTP (12 times) engage more in stimulating personal development compared to ETP with only 1 occurrence of personal development assistance.

Generally, STP, ETP and SHTP reflect the highest proportion of PMs' support invoking 'Information exchange', 'Knowledge construction', and 'Access and motivation', respectively. It therefore seems that, compared to STP and ETP, SHTP has the strongest tendency of creating a motivating learning environment.

*RQ3: Which kind of e-moderating support encourages thread continuity or thread discontinuity?*

The frequencies of thread continuity and discontinuity as the result of practicing a single e-moderating support are presented in Table 5. Thread continuity refers to threads with STP and ETP.

Table 5

*Effect of Single E-Moderating Support on Thread Termination and Development*

| Enactment of a single e-moderating support | No. of threads continued | No. of threads discontinued | Total number of enactments |
|---|---|---|---|
| Access & motivation | 0 (0.00%) | 20 (100.00%) | 20 |
| Socialization | 5 (17.24%) | 24 (82.75%) | 29 |

| | | | |
|---|---|---|---|
| Information exchange | 26 (78.78%) | 7 (21.21%) | 33 |
| Knowledge construction | 22 (100.00%) | 0 (0.00%) | 22 |
| Development | 7 (70.00%) | 3 (30.00%) | 10 |
| | Total = 60 | Total = 54 | Total = 114 |

Firstly, of the five e-moderating supports, the use of 'Access and motivation' support when used individually, tended to result in the highest chance of early thread discontinuity (100.00%), followed by 'Socialization' (82.75%), 'Development' (30.00%), and 'Information exchange' (21.21%). Second, the usage of 'Knowledge construction' support tended to promote thread growth all the time.

Since 'Knowledge construction' support promoted thread continuity, we further examined the effect of other facilitation supports in combination with 'Knowledge construction' support. As shown in Table 5, only 114 postings out of 416 postings contributed by PMs had single facilitation support. Overall, our investigation showed that many PMs used multiple rather than single support to moderate their discussions. By multiple, various combinations of moderating supports performed by PMs are considered. The most common combinations of students' moderation supports and their chance of thread termination and development are displayed in Table 6.

Table 6

*Effect of Plural E-Moderating Supports on Thread Termination and Development*

| Enactment of plural e-moderating support | No. of threads continued | No. of threads discontinued | Total number of enactments |
|---|---|---|---|
| Access & motivation + Information exchange | 15 (75.00%) | 5 (25.00%) | 20 |
| Access & motivation + Knowledge construction | 42 (95.45%) | 2 (4.54%) | 44 |
| Socialization + Information exchange | 22 (56.41%) | 17 (43.58%) | 39 |
| Socialization + Knowledge construction | 21 (100.00%) | 0 (0.00%) | 21 |
| Socialization + Development | 4(80.00%) | 1 (20.00%) | 5 |
| Information exchange + Knowledge construction | 48 (96.00%) | 2 (4.00%) | 50 |
| Knowledge construction + Development | 12 (100.00%) | 0 (0.00%) | 12 |
| | Total = 164 | Total = 27 | Total = 191 |

Among all various combinations, it was found that the combination of 'Socialization' and 'Knowledge construction' supports and the combination of 'Knowledge construction' and 'Development' supports have

the highest tendency of continuing growth of threads (100.00%), followed by the combination of 'Information exchange' and 'Knowledge construction' (96.00%), and the combination of 'Access & motivation' and 'Knowledge construction' (95.45%). It is found that 'Access & motivation' and 'Socialization' supports are more effective when combined with the other techniques than when applied individually. 'Development' support was found to be more effective in attracting participation from other students when combined with 'Knowledge construction' than with 'Socialization' and promoted chances of success for all threads. Although the combination of 'Socialization' and 'Information exchange' support was not as effective as the other combination of this support (Socialization+Knowledge construction and Socialization+Development), it did more better than the application of a single 'Socialization' support to achieve an almost twenty-two (56.41%) out of thirty-nine chance of success for thread continuity.

In summary, e-moderating supports when used individually do not assure thread development and continuity all the time. 'Knowledge construction' by far, was the only exception that appeared to be successful in attracting participation from the other learners all the time. It is suggested to use 'Knowledge construction' support in combination with the other e-moderating supports in order to enhance the probability of thread continuity. Moreover, using 'Knowledge construction' support with 'Information exchange' and 'Development' supports is more helpful in stimulating viewpoints and providing basis for discussion.

# Discussion

Building on the results of the previous research showing lack of sustained online discussions in terms of thread continuity and growth, the main purpose of this study was to investigate thread patterns of peer-moderated AODs as well as the types of e-moderating supports in promoting thread continuity and discontinuity. The case study looked at thirty-six AOD forums in an undergraduate programme. To determine the patterns of AODs, the taxonomy of thread pattern from Chan et al.'s (2009) study was employed. To examine the nature of e-moderating supports, a coding scheme from Smet et al.'s (2010) study was used.

As to the first research question, the results indicate that the dominant pattern of growth in AODs is STP with 74 (37.94%) threads taking place in this category, followed by ETP with 46 (23.58%) threads. However, Chan et al.'s (2009) study suggested otherwise. Chan et al. (2009) found that ETP is the dominant thread pattern among graduate students.

With respect to the second research question, results of our investigation suggested that the undergraduate PMs tried to adopt varied patterns in e-moderation supports. However, exchanging information was the predominant moderating approach fulfilled by PMs, opposed to the rather restricted frequency of PMs' postings focusing on personal development. This finding is in line with Smet et al.'s (2010) study. More specifically, the overall pattern of e-moderating was not similar for all three different thread patterns, indicating that adoption of certain types of moderation supports results in differences in the pattern of threads. For example, posting more messages conveying information exchange and knowledge construction in contrast with posting of motivational messages seems to be associated with an

increase in thread development and shaping STP and ETP threads.

The third research question focused on the role of PMs' supports on thread development and termination. The result revealed that PMs mostly use combination of e-moderating supports (302 messages with two or more behaviors) rather than using a single support (114 messages with a single behavior) in their postings. In the cases in which 'Development' and 'Socialization' supports were utilized singly, more than half of the time threads were cut early. Further, it was found that the 'Knowledge construction' support, when used in combination with the other e-moderating supports, increases the chance of ensuring thread continuity. Basically, one indicator of 'Knowledge construction' is 'Questioning'. A similar result was also found in the research of Hew and Cheung (2008) and Chan et al. (2009), showing that questioning helps foster a sense of obligation in the other participants to reply to the questions and increase the thread continuity. Students' tendency to combine 'Knowledge construction' with other e-moderating supports results from the pronounced content-focus in the training sessions alerting students to use multiple behaviors, along with different types of questioning. Additionally, PMs should not use the 'Access and motivation' support singly because this will most likely result in an SHTP.

# Conclusion and Future Research

The overall results of this study imply that PMs' e-moderating behaviors can be fruitful regarding the sustainability of AODs in the form of STP and ETP. The results more specifically displayed that PMs of AOD made an effort to use multiple supports in facilitating their groups than simply using a single support. In addition 'Knowledge construction' had a positive impact on thread continuity when combined with less effective supports such as 'Access and motivation' and 'Socialization'. Practice of PMs in STP reported higher usage of 'Information exchange', 'Knowledge construction' and 'Socialization', which when used individually and in combination assisted PMs in developing the thread. Taking into account that the types of PMs' supports can determine and stimulate the shape of certain types of thread growth, a practical implication for training prospective PMs can be formulated as a result of the present study. A comprehensive PM training program is recommended to improve the nature and the activities of PMs and, as a result, also the patterns of thread growth.

There are three main areas in which limitations of this study exist. The first limitation that needs to be considered is the specific group of the participants engaged in the study. All participants included in this study were undergraduate educational science students. Future research should try to replicate the findings containing participants from other fields of the study or subjects. Furthermore, the current study used a blended course which employed advantages of both F2F and e-learning experiences. Since offline meetings may influence the practices of PMs and thus growth patterns of threads, it is recommended to focus on fully online courses as well for future investigations.

A second critical restriction of the study is that PMs' support was studied in isolation and independent from other students' activities and behavior. As mentioned by Bereiter (2002), there is a linkage between

the process of meaning-making and the context where it is made and they cannot be seen separately. So, the mutual influence of PMs and other students' behavior need to be considered in future studies (Roscoe & Chi, 2007). Moreover, the type of e-moderating behavior is only one aspect of peer moderation that might influence thread growth. The other aspects such as habit of mind and self efficacy of PMs need to be considered in future research.

Another suggestion for follow-up research refers to the applied research method. The primary means of data collection for this study was the students' log file being saved systematically in the LMS. However, using quantitative content analysis to measure types of e-moderating behaviors alone does not show the reason behind usage of such types of behaviors by PMs. Triangulation of data collection such as interviews and reflection logs should be adapted.

# References

Bereiter, C. (2002). *Education and mind in the knowledge age*. Mahwah, NJ: Lawrence Erlbaum Associates.

Chan, J. C. C., Hew, K. F., & Cheung, W. S. (2009). Asynchronous online discussion thread development: examining growth patterns and peer-facilitation techniques. *Journal of Computer Assisted Learning*, *25*(5), 438-452.

Chen, I. Y., Chen, N. S., & Kinshuk. (2009). Examining the Factors Influencing Participants' Knowledge Sharing Behavior in Virtual Learning Communities. *Educational Technology & Society, 12(1), 134-148*.

Cheung W.S. & Hew K.F. (2004) Evaluating the extent of illstructured problem solving process among pre-service teachers in an asynchronous online discussion and reflection log environment. *Journal of Educational Computing Research 30*(3), 197–227.

Cheung, W. S., & Hew, K. F. (2006). Examining students' creative and critical thinking and student to student interactions in an asynchronous online discussion environment: A Singapore case study. *Asia-Pacific Cybereducation Journal*, *2*(2), 1-11.

Choi, I., Land, S. M., & Turgeon, A. J. (2005). Scaffolding peer-questioning strategies to facilitate metacognition during online small group discussion. *Instructional Science, 33*(5), 483-511.

Collison, G., Elbaum, B., Haavind, S., & Tinker, R. (2000). *Facilitating online learning: Effective strategies for moderators*. Madison: Atwood.

De Smet, M., Van Keer, H., & Valcke, M. (2008). Blending asynchronous discussion groups and peer tutoring in higher education: An exploratory study of online peer tutoring behaviour. *Computers &*

*Education*, *50*(1), 207-223.

De Smet, M., Van Keer, H., & Valcke, M. (2009). Cross-age peer tutors in asynchronous discussion groups: A study of the evolution in tutor support. *Instructional Science*, *37*(1), 87-105.

De Wever, B., Van Keer, H., Schellens, T., & Valcke, M. (2010). Roles as a structuring tool in online discussion groups: The differential impact of different roles on social knowledge construction. *Computers in Human Behavior, 26*(4), 516-523.

Dennen, V. P. (2005). From message posting to learning dialogues: Factors aff ecting learner participation in asynchronous discussion. *Distance Education, 26*(1), 127148.

Gairín-Sallán, J., Rodríguez-Gómez, D., & Armengol-Asparó, C. (2010). Who exactly is the moderator? A consideration of online knowledge management network moderation in educational organisations. *Computers & Education*,*55*(1), 304-312.

Guzdial, M. (1997). Information ecology of collaboration in educational settings: Influence of tool. In R. Hall, N. Miyake, & N. Enyedy (Eds.), *Proceedings of Computer Support for Collaborative Learning 1997* (pp. 83–91). Toronto: University of Toronto.

Guzdial, M., & Turns, J. (2000). Effective discussion through a computer-mediated anchored forum. *The journal of the learning sciences*, *9*(4), 437-469.

Henri, F. (1991). Computer conferencing and content analysis. In A.R. Kaye (Eds.), *Collaborative Learning Through Computer Conferencing: The Najaden Papers* (pp. 115–136). New York: Springer.

Hew, K. F., & Cheung, W. S. (2008). Attracting student participation in asynchronous online discussions: A case study of peer facilitation. *Computers & Education, 51*(3), 1111-1124.

Hew, K. F., Cheung, W. S., & Ng, C. S. L. (2008). Student contribution in asynchronous online discussion: A review of the research and empirical exploration. *Instructional Science, 38*(6), 571-606.

Hewitt, J., & Teplovs, C. (1999). An analysis of growth of patterns in computer conferencing threads. In C. Hoadley (Eds.), *Proceedings of CSCL'99: The third international conference on computer support for collaborative learning* (pp. 232–241). Mahwah, NJ: Erlbaum.

Hewitt, J. (2003). How habitual online practices affect the development of asynchronous discussion threads. *Journal of Educational Computing Research, 28*(1), 31–45.

Hewitt, J. (2005). Toward an understanding of how threads die in asynchronous computer conferences. *Journal of the Learning Sciences, 14*(4), 567–589.

Jeong, A. (2004). The Combined Effects of Response Time and Message Content on Growth Patterns of

Discussion Threads in Computer-Supported Collaborative Argumentation. *Journal of distance education*, *19*(1), 36-53.

Lipponen, L., Rahikainen, M., Lallimo, J., & Hakkarainen, K. (2003). Patterns of participation and discourse in elementary students' computer –supported collaborative learning. *Learning and instruction*, *13*(5), 487-509.

Masters, K., & Oberprieler, G. (2004). Encouraging equitable online participation through curriculum articulation. *Computers & Education*, *42*(4), 319-332.

Mazzolini, M., & Maddison, S. (2003). Sage, guide, or ghost? The effect of instructor intervention on student participation in online discussion forums. *Computers and Education, 40*(3), 237-253.

Michinov, N., Brunot, S., Le Bohec, O., Juhel, J., & Delaval, M. (2011). Procrastination, participation, and performance in online learning environments. *Computers & Education*, *56*(1), 243-252.

Murphy, E., & Coleman, E. (2004). Graduate students' experiences of challenges in online asynchronous discussions. *Canadian Journal of Learning and Technology, 30*(2). http://www.cjlt.ca/index.php/cjlt/article/view/128.

Neuendorf, K. A. (2002). *The content analysis guidebook*. Thousand Oaks, CA: Sage Publications.

Ng, C. S. L., Cheung, W. S., & Hew, K. F. (2009). Sustaining asynchronous online discussions: Contributing factors and peer facilitation techniques. *Journal of Educational Computing Research*, *41*(4), 477-511.

Roscoe, R. D., & Chi, M. T. (2007). Understanding tutor learning: Knowledge-building and knowledge-telling in peer tutors' explanations and questions. *Review of Educational Research*, *77*(4), 534-574.

Salmon, G. (2000). *A model for CMC in education and training. E-moderating. The key to teaching and learning online*. London: Kogan Page.

Schellens, T., Van Keer, H., Valcke, M., & De Wever, B. (2007). Learning in asynchronous discussion groups: a multilevel approach to study the influence of student, group and task characteristics. *Behaviour & Information Technology*, *26*(1), 55-71.

Smet, M. D., Keer, H. V., Wever, B. D., & Valcke, M. (2010). Cross-age peer tutors in asynchronous discussion groups: Exploring the impact of three types of tutor training on patterns in tutor support and on tutor characteristics. *Computers & Education*, *54*(4), 1167-1181.

Strijbos, J. W., & De Laat, M. F. (2010). Developing the role concept for computer-supported collaborative learning: An explorative synthesis. *Computers in human behavior*, *26*(4), 495-505.

Suh, W. (2011). *Effects of adaptive feedback on achievement, participation, and interaction patterns in*

*online group discussion*. (Doctoral dissertation). Pennsylvania State University, USA.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Weed, D., Spurlock, A., & Forehand, W. (2014). On-line discussions in nursing education: Increase retention and utilize innovative teaching strategies. *Teaching and Learning in Nursing*, *9*(1), 27-29.

Wigfield, A., & Eccles, J. S. (1992). The development of achievement task values: A theoretical analysis. *Developmental review*, *12*(3), 265-310.

Wong, S. L., & Bakar, K. A. (2009). Qualitative findings of students' perception on practice of self-regulated strategies in online community discussion. *Computers & Education*, *53*(1), 94-103.

Xie, K. (2013). What do the numbers say? The influence of motivation and peer feedback on students' behaviour in online discussions. *British Journal of Educational Technology*, *44*(2), 288-301.

Xie, K., & Ke, F. (2011). The role of students' motivation in peer-moderated asynchronous online discussions. *British Journal of Educational Technology, 42*(6), 916-930.

Zhang, Y., Fang, Y., Wei, K. K., & Chen, H. (2010). Exploring the role of psychological safety in promoting the intention to continue sharing knowledge in virtual communities. *International Journal of Information Management*, *30*(5), 425-436.