UNIVERSITI PUTRA MALAYSIA

IMPACT OF ROLE ASSIGNMENT ON TERTIARY DISTANCE EDUCATION STUDENTS' PARTICIPATION IN ONLINE DISCUSSIONS AND ITS CONSEQUENCE ON GRADE PERFORMANCE

HAJAR GHADIRIAN NAJAF ABADI

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By

HAJAR GHADIRIAN NAJAF ABADI

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

November 2015

DEDICATION

This thesis is dedicated to:

All I love,
My beloved mother,
My beloved father,
␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣␣
encouragement to continue my study and for his boundless love, understanding,
patience and support throughout my study
in Malaysia

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November 2015

Chairman : Associate Professor Ahmad Fauzi Mohd Ayub, PhD
Faculty : Educational Studies

Online discussion forums have become widely adopted as a primary venue for discourse in distance courses. Participation in online discussions is essential element for successful learning experiences. Taking into account prior research suggesting lack of students' participation in online discussions, this study conducted a quasi-experimental crossover research design with 84 registered students at an undergraduate blended course in UPM Education and Training (UPMET), hosted in Universiti Putra Malaysia (UPM) to investigate the effect of role assignment of peer moderator in advancing assigned students' participation and that of their group members' participation in online discussions. Moreover, the study examined the differences in levels of e-moderation supports enacted by peer moderators of high- and low-depth discussion forums. The influence of students' participation on their final course grades was also analyzed.

Eighty-four students were randomly assigned to groups of seven members that remained constant during the course. Students worked on seven weekly discussion topics during a regular semester. One week prior to onset of each online discussion, for each group, one student was randomly chosen as peer moderator who received two validated functional guidelines along with discussion topic for that particular week. Each student in the study received peer moderator role once. Log files of seven-week discussions were used to obtain the required data. Moreover, discussion transcripts of 30 peer moderators for two groups of high- and low-depth discussion forums- 15 each group- were collected and codified.

Paired samples t-tests were used to compare students' participation when assigned to the peer moderator role and when working as general responder. The results revealed that students in peer moderator role sent more messages ($t_{(83)} = 9.599$, $p < .001$) with more characters ($t_{(83)} = 5.455$, $p < .001$), replied more to messages of others ($t_{(83)} = 6.222$, $p < .001$), logged to the system more with no posting ($t_{(83)} = 8.899$, $p < .001$), and stayed longer in the system without posting ($t_{(83)} = 7.617$, $p < .001$). Meanwhile, the multiple linear regression analyses indicated that five indicators of peer moderators'

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participation together explained 66.1%, 60.5%, 15.0%, and 24.2% of the total variances for the group number of post, length of post, number of non-posting login, and length of non-posting login, respectively. Peer moderators' non-posting participation significantly influenced all indicators of group participation. The results of independent samples t-tests indicated significant differences between high- and low-depth discussion forums in relation to the frequency of peer moderators' e-moderation supports simulating: "access and motivation" ($z = -4.672$, $p < .001$), "socialization" ($t_{(28)} = 7.614$, $p < .001$), "information exchange" ($t_{(28)} = 6.051$, $p < .001$), "knowledge construction" ($t_{(28)} = 9.216$, $p < .001$), and "development" ($z = -3.150$, $p = .002$).

Using multiple linear regression analysis, one factor from quantity posting participation (number of post) and one factor from quantity non-posting participation (length of non-posting login) were identified as the predictors of students' final course grades ($R^2 = .578$, $F_{(83)} = 27.090$, $p < .001$). In conclusion, these findings suggest that introduction of role assignment into courses utilizing online threaded discussions is an effective strategy that can result in increased participation, leading to better learning performance.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Doktor Falsafah

KESAN PERANAN TUGASAN TERHADAP PENGLIBATAN PELAJAR PENDIDIKAN JARAK JAUH DALAM PERBINCANGAN ATAS TALIAN DAN KONSEKUENNYA DALAM GRED PENCAPAIAN

Oleh

HAJAR GHADIRIAN NAJAF ABADI

November 2015

Pengerusi : **Ahmad Fauzi Mohd Ayub, PhD**
Fakulti : **Pengajian Pendidikan**

Forum perbincangan atas talian telah diterima pakai secara meluas sebagai medan utama bagi perbincangan kursus jarak jauh. Penglibatan dalam perbincangan atas talian merupakan elemen penting untuk memastikan kejayaan dalam pengalaman pembelajaran. Dengan mengambil kira kajian lepas yang mencadangkan kurang penglibatan pelajar dalam pembelajaran atas talian, kajian yang dijalankan menggunakan reka bentuk penyelidikan kuasi eksperimen silang dengan 84 pelajar prasiswazah yang mendaftar dengan kursus teradun di UPM Education and Training (UPMET) bertujuan untuk menentukan kesan peranan tugasan moderator rakan sebaya dalam meningkatkan penglibatan pelajar dan penglibatan ahli kumpulan dalam perbincangan atas talian. Di samping itu, kajian ini turut mengkaji perbezaan tahap sokongan e-moderasi yang dimainkan oleh moderator rakan sebaya dalam perbincangan atas talian berdensiti tinggi dan rendah. Pengaruh penglibatan pelajar dalam perbincangan atas talian ke atas markah akhir kursus juga dianalisis.

Lapan puluh empat pelajar berdaftar telah diberikan kumpulan secara rawak dengan tujuh orang ahli bagi setiap kumpulan yang kekal di sepanjang kursus. Pelajar akan berbincang tentang topik perbincangan yang diberikan setiap minggu sepanjang semester berjalan. Seminggu sebelum sesuatu topik dibincangkan atas talian, bagi setiap kumpulan, seorang pelajar akan dipilih secara rawak selaku moderator rakan sebaya yang diberikan dua garis panduan yang telah dilakukan kesahan bersama dengan topik perbincangan bagi minggu tersebut. Setiap pelajar dalam kajian ini berpeluang untuk memainkan peranan sebagai moderator rakan sebaya sebanyak sekali. Fail log bagi perbincangan selama tujuh minggu telah digunakan bagi mendapatkan data yang diperlukan. Di samping itu, transkrip perbincangan 30 moderator rakan sebaya dari dua kumpulan berdensiti tinggi (15 setiap kumpulan) dan rendah (15 kumpulan) dikumpul dan diberikan kod.

Ujian t-berpasangan digunakan untuk membandingkan penglibatan pelajar apabila ditugaskan sebagar moderator rakan sebanya dan juga sebagai peserta. Dapatan kajian menunjukkan bahawa pelajar berperanan sebagai moderator rakan sebaya memberikan

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lebih banyak mesej ($t_{(83)} = 9.599$, $p < .001$) dengan lebih banyak karakter ($t_{(83)} = 5.455$, $p < .001$), membalas lebih banyak mesej kepada yang lain ($t_{(83)} = 6.222$, $p < .001$), lebih banyak memasuki sistem tanpa melakukan posting ($t_{(83)} = 8.899$, $p < .001$) dan lebih lama berada dalam sistem tanpa posting ($t_{(83)} = 7.617$, $p < .001$). Sementara itu, analisis regresi linear pelbagai menunjukkan terdapat lima indikator penglibatan moderator rakan sebaya yang menerangkan 66.1%, 60.5%,15.0% dan 24.2%, daripada jumlah keseluruhan varians bagi bilangan kumpulan yang melakukan *post*, tempoh *post* yang dilakukan, bilangan login tanpa melakukan *posting*, dan tempoh login tanpa melakukan *posting* masing-masing. Ujian t-tak bersandar menunjukkan terdapat perbezaan signifikan di antara forum berdensiti tinggi dan rendah dari segi frekuensi sokongan e-moderasi moderator rakan sebaya terhadap akses dan motivasi ($z = -4.672$, $p < .001$), sosialisasi ($t_{(28)} = 7.614$, $p < .001$), pertukaran informasi ($t_{(28)} = 6.051$, $p < .001$), pembinaan ilmu pengetahuan ($t_{(28)} = 9.216$, $p < .001$), dan pembangunan ($z = -3.150$, $p = .002$).

Dengan menggunakan analisis regresi pelbagai, satu faktor dari kuantiti bilangan melakukan posting dan satu faktor dari penglibatan tanpa melakukan *posting* (tempoh login tanpa melakukan *posting*) telah dikenal pasti sebagai peramal kepada gred akhir kursus pelajar ($R^2 = .578$, $F_{(83)} = 27.090$, $p < .001$). Se bagai kesimpulan, hasil kajian ini mencadangkan agar pengenalan kepada tugasan peranan dimasukkan ke dalam kursus dengan menggunakan perbincangan teruntai atas talian merupakan strategi efektif yang dapat meningkatkan penglibatan dan seterusnya membawa pelajar ke arah prestasi pembelajaran yang lebih baik.

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I certify that a Thesis Examination Committee has met on 6 November 2015 to conduct the final examination of Hajar Ghadirian Najaf Abadi on his thesis entitled "Impact of Role Assignment on Tertiary Distance Education Students' Participation in Online Discussions and its Consequence on Grade Performance" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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This is to confirm that:
- the research conducted and the writing of this thesis was under our supervision;
- Supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
CALC	Centre for the Advancement of Language Competence
CGPA	Cumulative Grade Point Average
CMC	Computer-Mediated Communication
CSCL	Computer Supported Collaborative Learning
DV	Dependent Variable
F2F	Face-to-Face
GCS	Group Cohesion Scale
IV	Independent Variable
L/CMS	Learning or Course Management Systems
MMU	Multimedia University
MOE	Ministry of Education
MySQL	My Structured Query Language
NetDraw	A Windows Program for Visualizing Social Network Data
PHP	HTML-Embedded Scripting Language
PQRS	Pointing, Questioning, Resolving, Summarizing Framework
SEM	Structural Equation Modelling
SME	Subject Matter Expert
SNA	Social Network Analysis
SPSS	Statistical Package for the Social Science
SQL	Structured Query Language
UCINET	Software Package for the Analysis of Social Network Data
UiTM	Universiti Teknologi Mara
UNITAR	University Tun Abdul Raz
UPM	University Putra Malaysia
UPMET	Upm Education & Training
USM	Universiti Sains Malaysia
VIF	Variance Inflation Factor
VLE	Virtual Learning Environment
ZPD	Zone Of Proximal Development

CHAPTER 1

INTRODUCTION

1. 1 Background of the Study

Distance education is generally defined as "a method where the teacher and student, separated by space and/or time, use technology to communicate" (Moller & Huett, 2012, p. 7). In the Malaysian context, higher education institutions are rapidly proposing courses completely or partially online to fulfil the mission of the Malaysian Ministry of Higher Education (Hisham, 2004). Distance learning courses are implemented using learning or course management systems (L/CMS) within which computer-mediated communication (CMC) technologies are embedded (Dominic, 2008). The fully online courses are those that require students and their instructors to have access to a computer and the internet for the course accomplishment without the requirement of attending face-to-face (F2F) classes (Bates, 2005). On the other hand, blended or partially online courses are those in which students and instructors take the advantages of both classroom-based and e-learning environments (Bonk & Graham, 2006).

The learning process, however, depends on interactions between the student and teacher and between students as they work together (Foreman, 2003). In early generation of distance education using correspondence mode of delivery, interaction presented a difficult task (Gorsky & Caspi, 2005). However, in the new generation and with current technologies, there are abundant choices for instructors to design interactive learning environments. In both fully online and blended courses, discussion forums, being asynchronous tools, are valued for the opportunities they afford for student-student interaction and construction of collaborative learning in the form of computer-supported collaborative learning (CSCL) (Allen, Seaman, & Garrett, 2007; Luppicini, 2007; Wise & Chiu, 2014; Wise, Saghafian, & Padmanabhan, 2012).

Findings from prior studies suggest that students' learning performance evaluated through final course grade highly correlated with participation in online discussion forums in distance education (Kunhi-Mohamed, 2012; Yukselturk, 2010). Participation refers to two main actions: reading and writing being measured through data such as number and length of post and login, types of participation, and patterns of participation. When learning discussions are truly collaborative, these two activities are intimately related and inform each other. Thus, how to motivate students to participate fully and successfully in online discussion forums that in turn affect learning outcomes of learners enrolled in the courses has definitely become an area of instruction worthy of instructor and researcher attention (Wuttikietpaiboon, 2012).

Efforts to attract students' participation have taken various paths. One strand of research focuses on the effect of moderation or facilitation (Ng, Cheung, & Hew, 2009). Moderation is "any kind of support given by a human to help at reaching the goal of the e-discussion" (Gil, Schwarz, & Asterhan, 2007, p. 227). Generally, there are two approaches to moderation of online discussions: computer-facilitation and human facilitation. Computer facilitation aims to directly affect the participation of students with software-embedded guidance without any prior training, while human facilitation

in the form of instructor or peer facilitation is usually done through training (Schwarz & Asterhan, 2011). Many studies supported the view that it is an instructor's facilitation rather than the computer's facilitation that may regulate students' participation in asynchronous online discussions. For example, Xie, DeBacker, and Ferguson (2006) found that instructor facilitation as "Master's voice" motivated students to participate in asynchronous online discussion. Basically, teachers motivate students' participation through enactment of four main tasks including organizational, technical, social, and intellectual functions (Gairín-Sallán, Rodríguez-Gómez, & Armengol-Asparó, 2010). Generally, keeping the discussion on track, giving encouragement, helping students overcome technical difficulties, and using problem-centric, curiosity-arousing wordings when initiating a discussion are activities fulfilled by instructors to promote students' participation (Hew, 2015; Yeh & Lahman, 2007). However, in many cases instructors' moderation was not able to effectively foster students' participation in online discussions because their constant presence oppressed certain students (Fauske & Wade 2003; Mazzolini & Maddison, 2003; Poole, 2000) and incurred the risk of teacher-centred discussions (Light, Nesbitt, Light, & White, 2000; Nickel, 2002). Evidently, "A challenge for . . . instructors of online management courses was to be able to achieve a level of student participation that supports a learning environment where students play a central role" (Bento, Brownstein, Kemery, & Zacur, 2005, p. 79).

Contrary to the previously mentioned studies, some other studies supported the value of non-moderated online discussions. Galanouli and Collins (2000) reported that their students successfully managed their online discussions without teacher moderation. Omitting moderation has some drawbacks as well. It has been reported that when the engagement of the moderator was minimal, students were frequently off task, there was a sense of confusion due to the lack of guidance, and offensive messages were posted freely (Light et al., 2000). Student moderation was perceived to be a more feasible alternative to instructor moderation and non-moderation in fostering students' comprehension and participation in online discussions because student moderators had better understanding of their peers' ways of thinking (Seo, 2007).

Tagg (1994) associated peer moderation to the use of 'leadership'. Learning in a peer moderation setting can be considered a specific type of collaborative learning (Topping, 2005) in which participants are assumed to negotiate meaning in small groups in which one peer clearly takes a supportive role as peer moderator. Hence, peer moderation encourages students to participate in online discussions and challenge the statement of others freely without being inhibited (Seo, 2004). Probably, it was no surprise that many suggested the use of peer moderation as alternative to teacher moderation in hope to provoke better learning outcomes as a result of higher participation (Xie, Yu, & Bradshaw, 2014; Ng et al., 2009).

1. 2 Peer Moderation of Online Discussions

During online discussions, students can be assigned to social role of moderator as alternative to tutor moderation to motivate discussions (Seo, 2007). Peer moderation was first introduced by Tagg (1994) who assigned his students conference-moderating role in online discussions. Role assignment is defined as a "scripting" technique that provides the benefits of peer (rather than instructor) facilitation (De Laat & Lally, 2004) and supports students with specific guidelines on how to engage in discussion

and coordinate effective and collective interaction patterns (King, 2007; Strijbos, Martens, Jochems, & Broers, 2004). A role can be appointed to one, some, or all members of the group. Scripted roles can also differ in their coercion level and thus may motivate or de-motivate students' participation (Dillenbourg, 2002). Strijbos and De Laat (2010) noted that in online discussions, peer moderation is supported in two primary ways: (a) scripted-peer moderation, when learners are appointed by instructors to support the process of the collaborative learning; and (b) emergent peer moderation, when students spontaneously or through negotiation with their group members take the role of moderators. It is the role without interference of the instructor (Strijbos & De Laat, 2010).

Considering peer moderation a specific type of collaborative learning, numerous benefits exist for both student moderators and group members in this type of learning (Duran & Monereo, 2005). Duran and Monereo (2005) explained both interpersonal and intrapersonal advantages which result from peer moderation. Scholars assert that learners assigned moderating role of online discussions often produce posts that contribute at higher levels of cognitive achievement in comparison with the other students (Zha & Ottendorfer, 2011). On the other hand, Xie et al. (2006) proposed that peer-led discussions entail beneficial impacts on students' attitude and motivation in online discussions. The above view of peer moderation points to the effect of role assignment on students' own behaviours. However, another view of peer moderation emphasizes the group process advantages that result from the acts of peer moderators (Mudrack & Farrell, 1995). Peer moderators' interventions appear to benefit group members in various ways. De Smet, Van Keer, and Valcke (2009) note that peer moderators can effectively model study skills such as concentrating on the material, organizing work habits, and asking questions. Central to the functioning of any group is the role of peer moderator (Forsyth, 1990). Moreover, it is perceived that in online discussions the relationship between moderator's frequency of moderation techniques and group participation is conditioned by the types of moderation supports enacted (Hew & Cheung, 2008; Ng et al., 2009). Researchers investigating collaborative learning in general and peer moderation in particular frequently refer to frameworks building on Vygotsky's social-cultural theory.

Vygotsky's theory emphasizes that, at any given age, full cognitive development requires social interaction through problem solving under adult supervision or in collaboration with more capable peers (Falchikov, 2001). More specifically, Vygotsky (1978) emphasizes that knowledge is interpersonal before it becomes intrapersonal, and in order to foster the construction of the former, social interaction is crucial. Further, Vygotsky's theory on the "zone of proximal development" (hereafter ZPD) appears to be connected with the effectiveness of peer moderator. The ZPD is "the distance between the actual developmental levels as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Jaramillo, 1996, p. 139). It pertains to peer moderation since this type of collaborative learning is characterized by the adoption of specific roles, where one partner clearly takes a direct pedagogical role (McLuckie & Topping, 2004). In this respect, the peer moderator is considered to adopt the role of facilitator, converting collaboration into learning opportunities.

Unlike the rapid use of peer moderation strategy in Western countries and among postgraduates, such practice has not been investigated among undergraduates of Asian

cultures. Moreover, study of literature review found that there has not been any extensive study on types of e-moderation behaviours enacted by undergraduate peer moderators in high depth- typically characterized by discussion forums with six or more levels of message postings- and low depth- typically characterized by discussion forums with five or fewer levels of message postings- online discussions.

1. 3 Understanding the Need to Motivate Students' Online Participation

The success of integration of online discussions into distance learning is based on the theory of social constructivism (Luppicini, 2007). The main premise of social constructivism is that students learn and construct their ideas collectively and individually through dialogue rather than passively absorbing them (Wise, Speer, Marbouti, & Hsiao, 2013). Many mechanisms have been asserted to elucidate such learning, containing the act of articulating one's idea, receiving feedback on these, the taking of multiple perspectives into account, the socio-cognitive conflicts caused by exposure to various views, and internalization of the collaborative activity (Lipponen, 2002; Stahl, 2006). In common, all depend on two basic interrelated activities that learners must engage in: contributing posts to the discussion (writing) and accessing existing posts (reading) (Rau, Gao, & Wu, 2008; Wise et al., 2013). By definition, online participation is the endeavour of a student to communicate with peers in a pedagogical setting through not only writing or talking, but also reading and listening (Hrastinski, 2008).

Measurement of participation in online discussions is done through the use of data such as the types of messages or quality measurement [e.g., level of critical thinking (Suh, 2011), the number and length of login as quantity non-posting participation (Kunhi-Mohamed, 2012), number of messages posted, number of replies, and message length as quantity posting measurement (Palmer, Holt, & Bray, 2008), and centrality and density (Xie et al., 2014)]. In online discussions posting behaviours leave visible records in the system (Cheung, Hew, & LingNg, 2008), while quantity non-posting participation measures the invisible online activities in the context of "lurker" research (e.g., Beaudoin, 2002; Nonnecke & Preece, 2003). In regard to the importance of number and length of post, it is suggested that number and length of posting in online discussions can be indicators of students' engagement with information exchange and perceived competence in the subject matter, while number and length of non-posting behaviors are indicators of student reading and reflection behaviours in online discussions (Xie, 2013). Moreover, lengthier messages lends itself to richer messages, both in terms of vocabulary richness and linguistic diversity (Huffaker, 2010), which in the context of this study can be richer in terms of e-moderating behaviours.

However, what is important in successful online discussions is to have sustained or deep discussions. Sustained or deep online discussions are characterized to have six or above levels of postings (Hew & Cheung, 2008). The more levels a discussion forum has, the greater the opportunity to interact and to integrate viewpoints. This is because the participant would need to read the earlier levels of discussion before replying. Therefore, the depth of a discussion forum is reflective of the extent of interaction and knowledge construction in online discussions (Chacon, 2005). High-depth online discussions are defined in this study as discussion forums which are at least six levels deep. In contrast, low-depth online discussions are characterized as forums with five or fewer levels deep.

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In the context of online discussions, high quantity of participation by ways of both non-posting activities (e.g., reading others post, scanning others posts, etc.) and posting activities (e.g., asking questions, answering prior messages, writing messages with more characters written) gives students opportunity to encounter information and ideas that are different from their own, compare their ideas with those of others, negotiate multiple perspectives, modify their individual views, and build knowledge as a group (Hayes & Walsham, 2000; Kahn, 2008) which then enhance learning experience (Bossche, Seger, & Kirschner, 2006). As Vygotsky (1978) mentioned, social interaction help learners bridge the gap between the known and unknown, which he called the ZPD. Peer moderation as a kind of collaborative learning provide students with a venue to learn both individually and socially; and for a discussion to take place, initial writing and posting of messages by students is a need. Scaffolding offered by the role of peer moderator can not only enable assigned students themselves to better participate in discussion through internalization but also that of their peers through the graduate shifts to the next ZPD. Probably, without some sort of scaffolding, like which discussion peer moderation offer, many students may never know how to get the most out of every discussion.

Generally, there is agreement on researchers that student who participate more in online group discussions gain higher grades (Alstete & Beutell, 2004; Mazzolini & Addison, 2003; Morris, Finnegan, & Sz-Shyan, 2005; Shaw, 2013). Probably, if there are more messages with more characters written, the student may have been more engaged in the information exchange and have more opportunities to reflect on the problems related to discussion topic (Yoo & Kim, 2014). On the other hand, students who do not post message may still be legitimate peripheral participants (Lave & Wenger, 1991), learning through their observations of others' interactions (non-posting participation). Thus, through active participation students can gain multiple perspectives that help them in better understanding of the subject and can exchange their ideas through network or community to benefit other members (Salomon, 1997).

1.4 Problem Statement

In online discussions, students' reluctance to participate in online discussions is a widespread problem (Dennen, 2008) that can contribute to failure of their learning performance (Yukselturk, 2010). Previous researches on examining factors influencing students' final course grades have usually used either of non-posing (Alstete & Beutell, 2004), posting (Green, Farchione, Hughes, & Chan, 2014; Shaw, 2013), and quality indicators (Strang, 2011) to correlate them with students' performance. However, a fuller understanding of students' participation in online discussions needs to combine both quantity posting and non-posting indicators to provide a better explanation of determinants of students' course performance (Dell, Low, & Wilker, 2010). Combining quantity posting with quantity non-posting, this study tried to extend upon prior research by Shaw (2013) and Alstete and Beutell (2004).

Meanwhile, many students do not meet their expectation for participation (Shaw, 2012; Hew, Cheung, & Ng, 2008). Equally important, the comments that are made frequently do not respond to or build on each other (Wise & Chiu, 2014; Zingaro & Oztok, 2012).This can result in discussions that are short and fragmented (Chan & Chan, 2011; Wise, Perera, Hsiao, Speer, & Marbouti, 2012; Zheng & Warschauer, 2015). For example, Cheung and Hew (2005) found that the majority of students' level of

discussion tended be low at only two levels. The limited responsiveness and interactivity found in many online discussions suggests a lack of attention to the ideas of others and that many students interpret discussion participation as being more about ''making posts'' than engaging in dialog (Wise et al., 2013). Probably, engaging in dialog or interactivity require students to read posts of varied others and write responses to them consecutively (Wise et al., 2012). Although, previous studies emphasized the importance of peer moderation in association with students' participation (Hew & Cheung, 2008; Leh, 2002; Poole, 2000; Xie et al., 2006; Zingaro, 2012), they also have limitations. First, these few studies were limited to small sample size, and neither study focused on the effects of introducing peer moderator role on moderators' own participation in online discussions including non-posting behaviours. A similar emphasis on making posts is seen in the literature. However, beyond making posts that contribute to knowledge construction, an important pre-condition for productive interactivity and lengthy discussion is engagement with the posts contributed by others through reading behaviours (non-posting participation) resulting in learners' aware of each other's ideas and the meaning of references between posts. Since counting mere number of students' posting failed to show reading behaviours, empirical research was needed to address this gap.

Second, only one study specifically focused on the influences of assigned peer moderators on their groups' participation including both posting and non-posting (Xie et al., 2014). While examining peer moderators' posting behaviours are critical for group success, behaviors that lie under the surface of online discussions such as the number and duration of time they spend in online discussions reading their group members' posts have not yet been connected to group members' contribution to the discussions. It is not clear which behaviors are most productive and should be encouraged. For example, is it more beneficial for peer moderators to login to a discussion frequently but relatively briefly, or in a fewer number but extended or longer session?. Moreover, Micari, Streitwieser, and Light (2006) recommended for further research on the link between peer moderators' participation and group learning interaction. Given the lack of research focusing on this part, it seemed appropriate to conduct a research to fulfil this gap.

Moreover, previous studies that investigated moderation supports in online discussions were mostly conducted in Western countries (Gairín-Sallán et al., 2010; Xie et al., 2014) or they focused on instructor facilitation techniques (Winograd, 2003). Furthermore, the extant research on student moderation is limited in two ways. First, the exact moderation behaviours that peer moderators were supposed to perform were typically not delineated clearly (Hew & Cheung, 2008). For example, in Gilbert and Dabbaghs's (2005) study, student facilitators were provided with an article entitled ''The role of the online instructor/facilitator''. It was a web-based resource explaining the various roles in an online discussion; however, what it entailed was not clearly elaborated. Second, few studies done on peer facilitation did not delineate the actual types of peer moderators' e-moderating supports used to achieve deeper discussions in online discussions forums. Mostly, focus of these few studies' investigation was on the quality of online discussion forums [i.e., discussion forums that had higher-level of knowledge construction occurrences (Hew & Cheung, 2008)] or quantity of online discussion forums [i.e., discussion forums with more frequencies of message postings (Chan, Hew, & Cheung, 2009)]. More specifically, online discussions' depth and types of e-moderation supports that may lead to deeper discussions in online discussions forums were not explored. The depth of online discussions has been chosen for this

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study because it is believed that the goal of using online discussions is to enable students to have discussion and online dialogue with each other (Guzdial & Turns, 2000; Hewitt, 2005). Measuring the depth of online discussions can provide a way to see if conversational exchanges or discussions are taking place (Dennen, 2008). Although, lengthy discussions do not inherently suggest deep processing or collaborative meaning making, but it is unlikely that such processes could occur in the absence of sustained discourse or deep discussions.

In the context of Malaysia, Ling, Lee, Chuah, and Koo (2012) proposed that majority of distance students know the value of participating online. In the meanwhile, Sai, Lin, and Belaja (2013) addressed students' low level of participation in online discussion forums as of one of the challenges faced by the distance learners. In the other study, Ali, Azmanuddin, Ali, Ayub, and Adullah (2011) mentioned that there is significant negative correlation between perceived problems imposed by groupwork specially sharing knowledge and the perception of online learning among distance learners. It seems that distance learners perceived online participation as a good mean for their learning experiences but low level of peers' participation discourage them to actively participate in online discussions. Apart from that, distance learners needed continuous presence of teacher to guide their learning (Krish, 2011). With huge number of enrolled students in most of online courses in Malaysia, course instructor need to put more effort and time in the situation to read the posts, monitor opinions, answer students' questions, and ask appropriate questions to keep the discussion going. Not all instructors may be able to dedicate the amount of time and energy needed to facilitate the discussions. Moreover, majority of them are "products" of a F2F institution themselves (Dzakiria, 2012). Their low presence in online discussions may cause negative perceptions from the viewpoint of distance learners and demotivate them (Belaja, Sai, & Lin, 2012).

As suggested by prior research peer moderation can be used alternative to instructor moderation. However, the comprehensive review of literature demonstrated that no research directly and empirically examined the effects of role assignment as peer moderator on students' own online participation and that of their peers in the context of Malaysia. Moreover, the relation between online participation and final course grade has only been investigated among post graduates using only qualitative information to correlate it with course grade (Ravichandran & Kaur, 2013) without consideration of posting and non-posting behaviours. Hence, this study provided strong evidence concerning the need for and means of achieving higher level of students' participation through the practice of role assignment of peer moderator among undergraduate distance courses.

1.5 Objectives of the Study

The objectives of this study were as follows:

1. To examine the effect of assigning undergraduate students with official role of peer moderator on their participation (quantity posting and quantity non-posting) in asynchronous online discussions;
2. To determine key factors (undergraduate peer moderators' quantity posting and quantity non-posting) influencing group members' participation (quantity posting and quantity non-posting) in asynchronous online discussions;

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3. To determine the differences in levels of e-moderation behaviours enacted by undergraduate peer moderators in high- and low-depth asynchronous online discussions;
4. To determine key factors (undergraduate students' quantity posting and quantity non-posting) influencing their final course grades in distance education courses.

1.6 Research Questions

This study aims to achieve the aforementioned research objectives through answering to the following research questions.

1. Do assigning undergraduate students with official role of peer moderator affect their quantity posting (number of post, length of post, and number of reply) and quantity non-posting (number of non-posting login and length of non-posting login) participation in asynchronous online discussions?

   (a) Is there difference in students' number of post between their assigned peer moderator role week and their subsequent weeks when the role is no longer assigned?

   (b) Is there difference in students' length of post between their assigned peer moderator role week and their subsequent weeks when the role is no longer assigned?

   (c) Is there difference in students' number of reply between their assigned peer moderator role week and their subsequent weeks when the role is no longer assigned?

   (d) Is there difference in students' number of non-posting login between their assigned peer moderator role week and their subsequent weeks when the role is no longer assigned?

   (e) Is there difference in students' length of non-posting login between their assigned peer moderator role week and their subsequent weeks when the role is no longer assigned?

2. What are the factors (undergraduate peer moderators' quantity posting and quantity non-posting) that influence group participation (quantity posting and quantity non-posting) in online asynchronous discussions?

   (a) Which factors of peer moderators' number of post, length of post, and number of reply (quantity posting) and number of non-posting login and length of non-posting login (quantity non-posting) influence group number of post?

   (b) Which factors of peer moderators' number of post, length of post, and number of reply (quantity posting) and number of non-posting login and length of non-posting login (quantity non-posting) influence group length of post?

   (c) Which factors of peer moderators' number of post, length of post, and number of reply (quantity posting) and number of non-posting login and length

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of non-posting login (quantity non-posting) influence group number of non-posting login?

(d) Which factors of peer moderators' number of post, length of post, and number of reply (quantity posting) and number of non-posting login and length of non-posting login (quantity non-posting) influence group length of non-posting login?

3. Do the high- and low-depth asynchronous online discussions differ with regard to the frequency of e-moderation behaviours utilized by undergraduate peer moderators?

(a) Is there difference in frequency of "access and motivation" behaviour utilized by undergraduate peer moderators between high- and low-depth asynchronous online discussions?

(b) Is there difference in frequency of "socialization" behaviour utilized by undergraduate peer moderators between high- and low-depth asynchronous online discussions?

(c) Is there difference in frequency of "information exchange" behaviour utilized by undergraduate peer moderators between high- and low-depth asynchronous online discussions?

(d) Is there difference in frequency of "knowledge construction" behaviour utilized by undergraduate peer moderators between high- and low-depth asynchronous online discussions?

(e) Is there difference in frequency of "development" behaviour utilized by undergraduate peer moderators between high- and low-depth asynchronous online discussions?

4. How well does the combination of undergraduate students' participation indices (number of post, length of post, number of reply, number of non-posting login, and length of non-posting login) influence their final course grades?

1.7 Significance of the Study

Findings of this study surface four critical implications that provide convincing justification for continued research in these areas of the online teaching and learning process. First, the study emphasised the importance of the participation in the online discussion. Participation in online discussions increases students' learning through active engagement with course materials and through various mechanisms including the act of articulating one's ideas, receiving feedback on these, the socio-cognitive conflict caused by exposure to divergent views, the taking of multiple perspectives into account, and the internalization of collaborative activity (Lipponen, 2002). By understanding the connection between participation and course grades, institutional leaders can design more effective interaction opportunities for students thereby further influencing academic success. Moreover, teachers for online classes mostly focus of visible data in LMSs. They also need to recognize that non-posting behaviour is taking

place, which may foster learning through knowledge acquisition, evaluation, application and reflection.

Second, the study provided strong evidence to exploit the use of peer moderation in undergraduate online courses. Parallel to rapid popularity of distance courses and online discussions and regarding the fact that learning focuses no longer on one-to-many communication (one teacher teaching and guiding all students), but more on many-to-many communication or learning (all students teaching and coaching each other), it is imperative to investigate on potentiality of peer moderation strategy to amplify students' participation in online discussions as compared to teacher moderation. The results can encourage instructors to adopt peer moderation strategy for encouraging students' participation. In turn, instructors may evolve this role and create more specialized roles that better meet the needs of individual curricula and classrooms and optimize students' participation in online courses. In other words, instead of taking an authoritarian role in online discussions, instructors can share the facilitation role with students, giving them the opportunity to explore unique ways to promote peers' active participation in threaded discussions.

Third, research on peer-moderated asynchronous online discussions suggested more research is needed to examine e-moderation techniques enacted in cases other than post graduate students (e.g., undergraduate students) and the kinds of techniques contributing to group performance (Hew & Cheung, 2008). The current study also expanded upon previous research (Xie et al., 2014) and makes contribution to key e-moderation supports performed by undergraduate peer moderators of online discussions in Asian cultures. By focusing on depth of online discussions, this study sought to provide awareness for prospective peer moderators in Asian cultures on the application of conversational functions to sustain online discussions. By informing students about different moderating strategies, as well as encouraging them to explore their own moderating strategy, instructors can empower students to drive their own learning and that of others.

Fourth, result of this study might be a starting point for designers of educational LMSs in improving the quality of LMSs through providing features that extract and visualize students' data regarding frequency of non-posting behaviours, depth and quantity of peer-to-peer interactions, manifested within the online discussion forums. Both posting and non-posting behavioural data are crucial information sources that can be used for learning diagnoses.

1.8 Limitation of the Study

The following discussion affirms several limitations of the study. One of the most apparent limitations was in terms of the format of the asynchronous online discussion forums. For the purpose of this study asynchronous online discussion forum embedded in PutraLMS was used. PutraLMS is a SCORM compatible and eLearning platform that was developed by local venders (Hamat, Embi, & Sulaiman, 2011). However, within PutraLMS students have access to the forum of all groups and there is no feature to make forum of one group invisible for the other groups. Another limitation of the study was the context where study was performed (in only UPM University), containing the academic level of the course (i.e., undergraduate's level), particular subject area (Education), and mode of the course delivery (blended course). Therefore,

students in this study would not necessarily be representative of the entire student population. Moreover, use of log files data measures alone could only partially show group interactions and could not consider social relations established through F2F class sessions or offline communications.

1.9 Definition of Terms

Below are the definitions of terms applied to the study to arrive at a common point of understanding.

1.9.1 Distance Education: Distance education as defined by Ryan (2013) is "Process of extending resource-sharing opportunities including learning and/or delivering instruction to locations away from a traditional college campus classroom. This includes both online or hybrid instruction." (p. 11). In the present study distance education refers to hybrid or blended mode of instruction.

1.9.2 Blended Learning: Blended learning brings together the advantages of the two learning environments which are classroom-based learning and e-learning (Bonk & Graham, 2006). In the context of this study, blended learning refers to the mixed delivery methods in the teaching and learning approach conducted continuously through F2F classroom participation and in the PutraLMS discussion forum platform.

1.9.3 Learning Management System (LMS): LMS is a term widely used interchangeably with virtual learning environment (VLE) and course management system (CMS) (Kunhi-Mohamed, 2012). LMS is an application utilized for delivering of instruction. For the purpose of this study, PutraLMS is the specific LMS utilized.

1.9.4 Online Discussion: There are two forms of online discussions which are asynchronous and synchronous discussions (Ellis, 2008). Asynchronous discussion refers to communication between students or users that do not occur at the same time, while synchronous discussion refers to communication that happen at the same time (Pittman, 2013). For the purpose of this study, online discussion refers to asynchronous communication that happens between members of an online course through the use of PutraLMS discussion forum.

1.9.5 Discussion Forums: Pittman (2013) defined discussion forum as "An asynchronous communication tool used by teachers and students to interact in distance learning courses by posting comments or questions" (p. 10). In the context of this study, a discussion forum is an asynchronous CMC tool embedded in PutraLMS that supports construction of CSCL in distance learning courses. It is used by teachers and students for interaction, knowledge sharing behaviour and knowledge construction. It allows students to post comments, answer comments of others, and read posted messages.

1.9.6 Peer Moderator: Peer moderator is a kind of scripted role being assigned to students by instructor (De Wever, Van Keer, Schellens, & Valcke, 2010a). In the context of this study a peer moderator acts as the leader of an online group discussion and preside it for one week. He/she is assigned by instructor and is responsible to enact a list of five main functions generated from Salmon's (2000) e-moderation model. The

actions include "access and motivation", "socialization", "information exchange", "knowledge construction" and "development".

1.9.7 Participation: Kunhi-Mohamed (2012) conceptualized participation as "the level of student involvement in a variety of activities such as total number of messages posted and total access" (p. 9). In the context of this study, participation refers to students' quantity posting behaviours evaluated through the number of message posted, the length of posted message, and number of reply in discussion forum and students' quantity non-posting behaviours measured through the number of non-posting login, and the length of non-posting login to the PutraLMS over the seven-online discussions. Length of post refers to written characters and number of reply refers to responses or build-on notes to messages posted by others. Number of non-posting login refers to the number of times students access the PutraLMS without any posts and length of non-posting login is the duration of access (calculated in hour) to the PutraLMS without any posts.

1.9.8 Depth of online discussions: As mentioned by Hew and Cheung (2008), discussion threads which had six or more levels of students' postings were considered sustained online discussions. A high-depth online discussion is defined in this study as discussion forums which are at least six levels of posting messages in which each post is link to the previous post as a response or reply. In contrast, low-depth online discussions are characterized as forums with five or fewer levels deep.

1.9.9 Grade Performance: Grade performance refers to "a measurement of academic success based upon students' final test and assignment scores" (Kunhi-Mohamed, 2012, p. 10). In this study, grade performance refers to accumulation of the students' midterm and final tests' scores and assignment scores being determined at the end of the semester by instructor.

1.9.10 Content Analysis: De Smet, Van Keer, and Valcke (2008) defined content analysis as ''a research methodology that builds on procedures to make valid inferences from text" (p. 1171). Generally, content analysis focus on revealing information that is not placed at the surface of the transcripts. For the present study, content analysis refers to a methodology used to determine the level of e-moderation supports employed by peer moderators of high- and low-depth online discussions.

1.9.11 Salmon e-moderation model: Salmon e-moderation model is taxonomical in structure directing e-moderating skills in CSCL (De Smet et al., 2008). For the basis of this study, Salmon e-moderation model (2000) is used to script the types of behaviours that peer moderators need to perform in moderating their online discussions. Based on Salmon e-moderation model peer moderators are supposed to enact five main tasks: access and motivation (e.g., elucidating the digital learning environment, conceptions about the moderator role, and being accessible to computer-related problems), socialization (e.g., encouraging participating and wishing good luck, informal talk, appreciating and confirming contributions, and showing commitment), information exchange (i.e., modeling and illustrating the contents with examples, personal views, and concepts, bringing in other content information, organizational arrangements and planning, unraveling the learning task, and explaining the learning task), knowledge construction (i.e., asking for content explanations and clarification, asking to summarize, giving feedback about learning and social processes, giving suggestions to

both the individuals and the group), and development (call for further reflection, elaboration, and playing devil's advocate).

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