

# Factors that influence peer learning in social media enhanced engineering courses

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## STRUCTURED ABSTRACT

### CONTEXT

Studies suggest that facilitating student's discourse in online learning environments enhance students' learning (Talaie Khoei and Talaie-Khoei 2015). Therefore, social networking services like Facebook are used to improve students' learning in online environments. Supports that social media can bring to peer learning via enhancing collaboration and communication among students especially in courses with large cohort of students is huge. Using social media in engineering courses provides opportunities of sharing ideas and information for students. However, it does not mean that students will actively participate in the discussions and learn from peers. In order to have effective peer learning in social media enhanced courses, there are factors that need to be considered.

### PURPOSE

This research aims to identify factors that affect students' peer learning in social media enhanced engineering courses.

### APPROACH

A desk study in conjunction with a review and analysis of Facebook social interaction data from two 1st year student (N = 1000) undergraduate engineering courses was conducted. Students and instructors' posts and comments from the Facebook group used in both courses over a full year were collected and analysed against a preliminary framework borrowing from Garrison et.al (2000).

### RESULTS

Peer learning in social media can be interpreted through a framework that views participant interactions that occur in four dimensions: social, teaching, cognitive, and student presence. In the first dimension, (social presence), a community among students can be identified through group cohesiveness. In addition, conversation opener and affective expressions are the indicators that need to be considered in this construct. In teaching presence dimension, factors that educators need to consider are facilitating and directing discourses. Setting goals and defining discussion topics as design and plan indicators are additional indicators that need to be considered. Student presence dimension indicates that students actively participating as both help seekers and help providers, which are associated with effective online peer learning behaviours.

### CONCLUSIONS

Finding of this study showed that using social media in engineering courses supports students learning, however in order to have effective peer learning, social, teaching, cognitive, and student presence are factors that need to be considered.

### KEYWORDS

Peer learning, social media, online discussion, engineering courses.

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## Introduction

The majority of students in higher education are using social media and benefits of using it in higher education has been pointed out by many researchers (Manca and Ranierit,2016). However, using of social media sites like Facebook in engineering courses has not been commonly applied. Statistics show that Facebook has 2.20 billion monthly active users (Facebook,2018) and still is the most popular social networking site worldwide(Manca and Ranierit,2016). Manca and Ranierit (2016) indicated that access to different information and learning resources are benefits of using Facebook in education for students. In addition, adopting social media in education provides opportunity of seeking help and sharing knowledge among students. This behaviour promotes deeper learning and increase social connectedness among students (Tervakari et.al, 2012). However, barriers like university policies, pedagogical and cultural issues are the main reasons that educators are not using Facebook in their courses (Manca and Ranierit,2013).

Engineers Australia (2016) stated PE1(knowledge based), PE2 (engineering ability) and PE3(Professional attribute) competency standards for professional graduates. While most of engineering curriculums in higher education are focusing on PE1 and PE2, using social media in higher education supports PE3 competences in engineering curriculum (Table 1).

**Table 1: Competencies in PE3 (Professional attributes) supported by employing social media in higher education**

PE3.1	Capacity to hear and comprehend others' viewpoints as well as convey information
	Effectiveness in discussion and negotiation and in presenting arguments clearly and concisely
PE3.2	Ability to assess the accuracy, reliability and authenticity of information
PE3.3	Readiness to engage in wide-ranging exchanges of ideas, and receptiveness to change
PE3.5	Communicate frequently and effectively with other team members
	Recognise the value of diversity, develop effective interpersonal and intercultural skills, and build network relationships that value and sustain a team ethic
	Mentor others, and accept mentoring from others, in technical and team issues

## Online community

McConnell (2006) emphasises that learning is a social process and should be developed in communities. Among online communities, Facebook is an accessible platform that facilities students' online discussions (Menziez & Lane,2015). Using social media in education help students to create an online community that encourages learners to interact with each other and through this interaction learn social and cognitive functions (McLoughlin & Oliver,1998). Community of learners create an environment that encourage support, sharing, evaluation of ideas and suggestions of possibilities with in a social context (Tierney and O'Flahaven ,1989). Strong sense of community among members can increase cooperation among members, commitment to group goals and information flow among all learners (Wellman,1999). In comparison, not having a community among learners rises risk of isolation and learners feeling alone are not willing to learn in this kind of environments (Wegerif ,1998).

Online community promotes interaction among students. The main reason for getting students communicate with each other is the pedagogy usefulness of communication practice in learning environments. Palloff and Prat (1999) state that the collaboration in learning which is generated from interaction among students is the success key in the process of learning. Without interaction, cycle of knowledge acquisition, knowledge validation and critical evaluation will not exist (Shale and Garrison ,1990). Hare et al. (1994) categorise interaction in to task –driven and socio-emotional. Task-driven interaction focuses more on completion of assigned tasks and it is more instructor oriented, while socio-emotional interaction focuses more on relationship among learners.

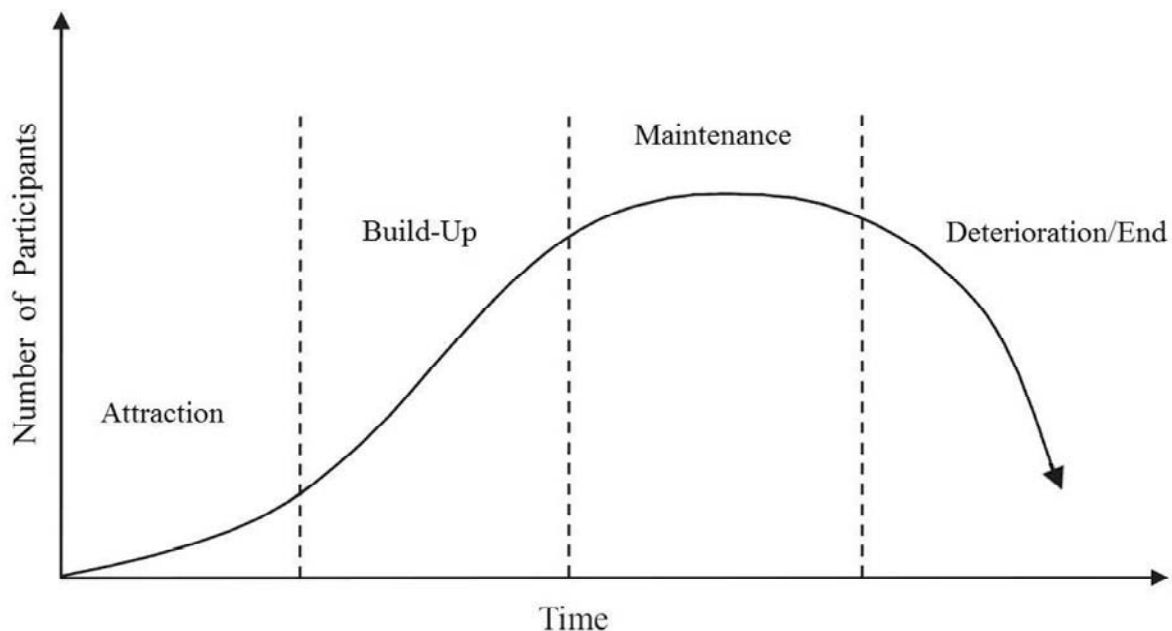
## Online community life cycle

Wang and Yu (2012) explained lifecycle of online communities in four different stages (Table 2).

**Table 2: Different stages of online community life cycle**

Stage	Description
Attraction	Starting stage in online communities. In this stage, active participants post information and attract students to the community.
Build-up	More students are attracted and started to communicate with other participants. They participate regularly.
Maintenance	Number of daily posts and number of participants exceed online communities handling capacity, so community creators start to maintain the posts.
Deterioration/End	Number of new posts decrease, participants stop participating and start leaving the community.

In first two stages, online communities are just created and need more students to participate in discussions. At these stages, active participants are the most desired type of participants. Increasing demand to this type of participants is due to necessity to posting interesting and useful information in discussions. Interesting posts attract more students to the discussion. During these stages, few messages are posted and community is facing lack of information. Soon, information in online communities become out of date and most of participants just comment on other students' post and do not provide new information, which make participants leave the community. At this stage, posting new information on regular basis helps the community to survive. In the third stage (Maintenance) number of active participants are crucial, so online community requires more participants to comment on other students' posts while providing new information is not important. In this stage, online community focuses more on retaining members. On the fourth stage (Deterioration/End), number of new information are reduced and participants start leaving the online community (Wang and Yu, 2012). Figure 1 shows changes in number of participants in online community life cycle.



**Figure 1: Number of participants in online community life cycle**

## Peer learning

Analyses show that online communication supports development of peer learning in the community (Arendale, 1993), enhances flexible learning, and fosters initiative and interactivity of learners in their learning process. Peer learning is well-established approach to improve students' interpersonal skills in an era that many universities struggling with the increasing diversity of students and challenges of supporting students' learning. Keppell et al. (2006) mentioned that developing teamwork skills and

increasing self-esteem and motivations in learning are benefits of peer learning. In addition, academic success and lifelong learning are two major achievements in peer learning that can be achieved through encouraging students to develop their own learning in constructive and social manner.

Students as learners in a learning community can support each other in process of building knowledge, explore their current understandings from learning materials and benefit from different range of perspectives (Kear,2004). Peer learning takes place when students discuss assignments, lectures, exams and projects in social settings (Keppell et.al,2006) and it helps them to construct their knowledge and share their understanding from the courses with other students. Topping (2005) defined peer learning as "*the acquisition of knowledge and skill through active helping and supporting among status equals or matched companions*". Peer learning is a relationship between students who are seeking help and students who are providing this help.

## **Social presence**

Universities are using social networking services to support students learning by increasing students' interactions with each other in online environments. Social presence is an important factor in students' collaboration with each other and it can create effective online discussions. In communities with evidence of social presence, students trust and respect each other and each other's ideas (Garrison et.al,2003).

Social presence make students feel that they are connected to each other and this connection helps them to share ideas and exchange views with other students. Low social presence in online discussions affect effective learning in negative way as it reduces students' engagement with other students (Kear,2010). Member profile feature in social networking sites increases students' participation and persistence, as students feel comfortable while participating in discussions. Member profile helps students to know each other better (Kear,2010) which leads to have a stronger community (Rovai,2002). According to Cutler (1995) if learners know about each other, there is more likely that they build trust and seek help. Community can increase sense of connectedness among learners and make them to feel being part of a group (Gibbs,1995). In comparison, lack of connectedness in community lead learners to isolation , reduce their motivations to learn and finally drives to low achievements.

Sense of community supports peer learning as learners know that they can call on for help whenever they need from other learners within the group (Wellman&Guila,1999). Trust is the feeling that learners should have on community members to rely on members of the community (Moorman et.al,1993) and it makes students feel safe to expose their learning gaps and make them confident that community members are supportive in response to their learning gaps.

## **Teaching presence**

Instructors are responsible for providing direct instruction to students and facilitating students' interactions by creating a community that facilitates students' learning in learning environments (Anderson.et.al,2001). Instructors must ensure that students interact with each other and that interaction takes place within a supportive and accepting context. This assurance promotes constructive peer interactions. However, in online environments due to not having physical connection, providing direct support and facilitating students' interactions are challenging. However, online discussion platforms help educators in this matter by facilitating ways to provide direct instruction via creating an online learning community. Instructors in online discussions should create a trustworthy and informal learning environment that make participants feel supported and confident while working with other students (Gulati,2004). Alvarez et al. (2012) divided teacher's responses in online discussions to elaboration and verification feedbacks. In verification feedback, students receive information about correctness of their provided answer while in elaboration feedbacks, teachers guide students in their learning path.

Except providing direct instructions and creating learning communities, presence of instructors in online discussions is helpful in controlling discussion directions and guiding their learning experiences. Instructors in learning environments should structure learning goals and manage conflicts among ideas (Johnson,1981) as students' interactions with each other may not lead to an effective collaboration and do not help them to achieve desired learning outcomes. Instructor presence in online discussions and respond to students' enquiries will solve this problem (Zhu, 2006; Kanuka and Garrison , 2004).

## Student presence

Statistics show that there is direct link between participating in online discussions and achieving higher grades. Postle and Sturman (2003) found that students who participated more in online discussion achieved better marks compare to students who never participated or participated less compare to their classmates. However, using such services to support students' learning, does not guarantee their participations.

Phang et al. (2009) noted that contribution and knowledge seeking are the two factors that value online discussions. Therefore, both group of participants who add information to discussions and those who seek information for their questions are important in this construct. In peer learning, both of help-givers and help-seekers need to function, and need to be balanced in proportion (Master George and Webb ,2003).

Taylor (2002) categorised students who are participating in online discussions to proactive group or workers, parsimonious participation group or shirkers, and peripheral participation group or lurkers. In discussions that students receive many responses for their enquires, active participants are being challenged and their learning are supported from constructivist (interaction, discussion, adoption, and reflection) point of view (Salmon,2003). Majchrzack et al. (2006) divided active participants to "synthesizers" and "adders". Synthesizers are those active participants who synthesize existing information, while adders are those kind of active participants that provide new information.

Shirkers are those type of participants who participate in online discussions irregularly. Shirkers may become active participants or lurkers. Due to key role of active participants in online community life cycles, shirkers can contribute well to this life cycle by adopting strategies to convert them to active participants. On the other hand, if shirkers show willingness to become lurkers, there is a chance that online communities expire sooner than expected.

Lurkers have significant impact on active participants. More lurking means less respond to students' enquiries and more likelihood that active participants become disenchanted and leave the discussions. Bowes (2002) categorised lurkers in to active lurkers and passive lurkers. Active lurkers are those participants who respond to students' posts through private environments (for example, using emails) and passive lurkers are those who just read other students' posts and never participate in discussions. Dennen (2008) stated that there are four types of lurkers: 1) participants who do not read and post; 2) participants who reads but do not post; 3) participants who are new in the discussion and not ready to post; and 4) participants who never want to participate in online discussions.

Participants who are new to online discussions should not be treated as lurkers. They may not start to participate in discussions immediately after joining; however, there is possibility that they become active participants later.

Preece et. al (2004) found out that lurking does not depend on factors like, age, sex or educational level ,and the reason they go online is to improve their understanding of the topic. Lurkers are less hostile than active participants, more tolerant to open discussions, technically sophisticated, and uncomfortable with languages that disrespect them (Katz ,1998).

Schultz and Beach (2004) state that reading or hearing other participants input, contributing to peer discussions, and receiving other participants' responses to own contributions are three ways that students can enhance their learning in online discussions. Active participants benefit from all of mentioned ways while lurkers are missing the last two.

## Conclusion

Using social media in engineering courses enhances students' learning and promotes peer learning in online environments. However, social, teaching, cognitive, and student presence are factors that need to be considered in this domain. In order to increase social presence, group cohesiveness, conversation opener and affective expressions are the indicators need to be considered. In teaching presence, instructors must set goals and define discussion topics prior to creating online discussions. Facilitating and directing discourses are additional indicators that need to be considered in this construct. Active participants, shirkers, and lurkers are different types of students identified in online discussions. Although active participants are important in peer learning in online discussions, role of lurkers and shirkers cannot be ignored, as there is a chance that shirkers and lurkers become active participants during online community life cycle.

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