COLLABORATION AND COMMUNITY OF PRACTICE IN ONLINE SOCIAL NETWORKING SERVICES AMONG MALAYSIAN UNIVERSITY STUDENTS

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Abstract

This article reports the results of an exploratory study to investigate the usage patterns of social networking services (SNS) by Malaysian tertiary level students. The focus in this paper is on the collaborative use of SNS including the factors (variables of level of study, gender and academic performance) that might have influenced how SNS is used by Malaysian students. This focus is necessary as so far, no research have looked at these variables across the population of Malaysian university students. An online survey was carried out using convenience sampling and this returned a usable result set of N=16661. Frequency analysis revealed that 68.6% of respondents used SNS to collaborate with their peers, and more than half join study groups on SNS (57.5%) as well as course groups created by their lecturers (56.1%) at a high level of frequency; many reported using SNSs often/all the time for these purposes. Further analysis showed statistical significance for almost all the variables investigated. However, results of Cohen's effect size indicated that the differences between the Postgraduate-Undergraduate variable pairs (Collaboration d = 0.27 and Community of Practice d = 0.24) have a small to moderate practical significance which may be meaningful. The findings suggest that the practical and pedagogical differences between undergraduate and postgraduate levels of study should be given due consideration when integrating the use of SNS into higher education in Malaysia.

Keywords: Online social networking, Collaboration, Community of practice, Undergraduate, Postgraduate

1. INTRODUCTION

The introduction of online social networking services (SNSs) has brought profound changes in the ways humanity interact, share and organise ourselves. One salient and oft-cited example of how SNS impacted the real world is the use of social media to organise, mobilise and direct political protesters during the events that came to be known as the 'Arab Spring' in 2010 – 2012 (Ghonim, 2012; Huang, 2011). The Arab Spring was a series of powerful mass political protests that took place in several Arab countries in the Middle East beginning with Tunisia in 2010, before spreading to other Arab states. It has since died down, with the notable exception of Syria, where the political protests turned into a full-blown civil war that is still ongoing at the time of writing. Post-Arab Spring, and after the excitement has worn off, scholars have begun to note that the role played by SNSs or social media may not have been what it was touted to be during the events themselves (Aday, Farrell, Lynch, Sides, & Freelon, 2012; Rosenstiel & Mitchell, 2012).

The example of the Arab Spring is highly useful as a reminder when discussing the use of SNSs within the fields of education. There were initially a lot of excitement on the potential of SNSs to be used effectively in education. However, as far back as 2010, Gouseti (2010) has discussed the pitfalls of hyping up social media technology when it comes to education. The prevalent idea is often enshrined in the view of technology as a 'silver bullet' to 'fix' or 'improve' education. Selwyn (2012) further states that the issues are not always clear cut 'good' vs 'bad' as often there are a myriad of factors that need to be considered when discussing SNSs in the context of higher education. These may include, but certainly not limited to, 'living' versus 'learning' use of SNS technology, the changing relationship between learner and knowledge, as well as the collaborative versus the individual aspects of SNSs in higher education. Another important consideration is the issue of context. What may work in one geographical location or region may not work across all. This is not limited to geography only as contexts also include factors such as age, race, gender, digital divides, socio economic divides and many others.

It is with the cognisance of these issues that the article is trying to shed some light on the nature of collaborative learning and the formation of communities of practice within SNSs among Malaysian university students. The specific questions that the article intends to answer are:

1. How do Malaysian university students collaborate via social networking services?

2. Do factors such as level of study, gender and academic performance influence the ways these university students collaborate on SNSs?

2. BACKGROUND

2.1. Social Networking Services

The term 'social networking services' (SNSs) encompasses digital tools that allow for the formation of networking, communication and sharing at their core. The term itself has been used interchangeably in the literature with 'social media', 'social networking sites' and 'social networks'. Boyd and Ellison (2007) provides a comprehensive and scholarly view of what constitutes an SNS. They gave the following description; 'a web-based service' that allows individuals to:

i. Construct public or semi-public profile within a bounded system;
ii. Articulate a list of other users with whom they share a connection;
iii. View and traverse their list of connections and those made by others within the system.

The definition by Boyd and Ellison draws attention to three core or defining characteristics of SNSs which are profiles, connections or friends, and traversing the networks or communities. These are explained further in the paragraphs below.

First, SNSs allow their users to create an online identity or profile to include information such as name, address, e-mail address, gender, date of birth, relationship status, education, work information, political and religious views, photos and other relevant information. According to Boyd (2007), this profile is almost like the idea of a personal web page, albeit in a more constrained format. These personal profiles can be customised with a variety of multimedia elements, ranging from text, images and videos (McLoughlin & Lee, 2007). These profiles can then be categorised into private or public elements. Information that are made public can be seen by all SNS users as well as non-users or even web crawlers while the information that are made private can either be viewed by friends who are connected to the user only or the user alone. The default settings of profiles for most SNSs are often public and thus, the users have the control of changing the default setting of public to private if they wish to protect their privacy. Some SNSs, like LinkedIn, exert some form of control where what viewers see would depend on the subscription mode chosen. Nevertheless, many studies on SNSs and privacy show that users most often do not change the default setting of their profiles (Gross & Acquisti, 2005; Krishnamurthy & Wills, 2008).

Second, in SNSs, a social network of friends can be formed to communicate and share information. These networks can consist of friends, family and colleagues or even strangers. This is because SNSs allow their users to create relationships with other SNS users by inviting these

other users to be ‘Friends’, ‘Contacts’ or ‘Fans’. However, these terms vary according to the sites. The number of contacts or friends a user has determines the strength of the user’s social network. In fact, the strength of SNSs depends on these social networks of users as the more friends a user has, the more users the SNSs have since SNSs exist based on these relationships.

Third, SNSs allow their users to ‘traverse’ or negotiate through their own as well as their friends’ social networks. There are also mechanisms that permit the users to leave ‘comments’ or messages on their friends’ profiles. These comments are displayed and visible to anyone who has full access to that profile (2007). In addition, there is also the option of private messaging services akin to web-mail. According to Boyd and Ellison (2007), this display of public connection is an essential part of SNSs. This makes the user becomes a part of a larger networked community. Therefore, it is not uncommon to find groups founded based on common beliefs, shared interests or specific needs within SNSs.

Beyond these basic characteristics, SNSs vary in terms of the features and the people who use them. Some SNSs have capabilities that focus on supporting video and photo sharing, such as Instagram and Snapchat, while others feature blogging and instant messaging services like Twitter and WeChat. Users may also be able to customise the add-ons they choose to install on their SNSs. These sites also provide users with various possibilities to create content and connect with each other. In fact, SNS users can share photos, music, links, videos and blog posts or even comment on the content posted by others, join groups and make affiliations with products or brands, organisations or political causes, or even search for others who share the same interests. A variety of communication tools, both synchronous and asynchronous, one to one and one to many, ranging from massively public to intimately private are also supported by these sites (Ellison, 2008). An important advancement since the publication of Boyd and Ellison (2007) is the convergence of platforms where mobile and web-based tools are increasingly tied together in a singular service. It is for this reason that the authors choose to use the term ‘social networking services’ as it is more encompassing than ‘social networking sites’.

2.2. Community of Practice

The Horizon Report, in defining SNSs, described SNSs as sites that “facilitate introduction and communication by providing spaces for people to connect around a topic of common interest” and that these sites are “fundamentally about community – communities of practice as well as social communities” (New Media Consortium & EduCause, 2007, p. 12). A key characteristic of SNSs

is about connecting, and when this is applied to learning, it somehow lends itself to groups of people coming together to learn in a variety of different communities depending on their interest or needs.

Arguably, the focus of many popular SNSs is on sharing of information of users' personal life. However, when extended to learning, SNSs have the potential to connect students to new resources and each other, integrating both online and offline experiences (Mejias, 2006) and building their own 'personal communities' which is described by Wellman and Gulia (1999, p. 335) as "an individual's social network of informal, interpersonal ties, ranging from a half dozen intimates to hundreds of weaker ties". Inherently, through SNSs, users get to be connected to others who share the same interests, and for students, this creates opportunities for them to create their own communities of learners who share the same learning objectives where learning can take place even outside the classroom. Utilisation of SNSs to enhance community of practice in the university classrooms makes for a strong argument because a sense of community and a sense of belonging is an essential element for successful learning to occur (Hung & Yuen, 2010). Therefore, SNSs could be seen as a powerful tool that could empower students to be at the centre of their own learning experience.

Lave and Wenger's theory of situated learning provides the conceptual framework through which the social nature of learning can be understood. Rooted in Vygotskian perspectives on learning, this theory further proposes the concept of 'Communities of Practice' (CoP) when discussing the idea of legitimate peripheral participation. Of late, the creation of various online communities on the Internet has resulted in more interest in the concept of CoP. This concept was further extended by Wenger and applied into other domains. In essence, CoP is a process of social learning that arises out of the collaboration, sharing of ideas and interaction among a group of people who shares the same interest over an extended period of time. CoP is defined in brief by Wenger and Trayner-Wenger (2015, p. 1) as: "...groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly." Wenger & Trayner-Wenger (2015) went on to explain that learning can be the reason for the community to come together. Nevertheless, they were quick to point out that not all communities are CoP and asserted that there are three characteristics which are necessary in identifying a CoP, and these are:

i. The Domain – A CoP has an identity that is characterised by the domain of interest shared among the members, and a person's membership of the community implies a commitment towards the domain. However, the domain does not necessarily have to be recognised as 'expertise' outside of the community.
ii. The Community – Members in CoP pursue their interest in their domain by engaging in shared activities and discussions, helping each other out, and sharing information and building relationships that enable them to learn from each other. Nevertheless, the activities and interaction among the members do not have to happen on a daily basis; it is the interactions which are essential in making them a CoP. Wenger gave the example of a group of Impressionist painters who would sometimes meet up in cafes to discuss their painting styles but would normally go back and paint alone.
iii. The Practice – A CoP is not just about a group of people with shared interests; these members are essentially 'practitioners'. A CoP develops shared repertoire of resources or a shared practice which can be experiences, stories, tools or even ways of handling problems which are difficult or keep recurring. A CoP involves continuous interaction and takes time to develop. Thus, even informal conversations held by people of the same profession, for example teachers or even students where they share their stories, experiences or tools, can become a shared repertoire for their practice.

Based on the three defining characteristics of CoP above, it can be argued that a group of students who come together and continuously interact and participate via SNSs to pursue their learning needs and interests by sharing their knowledge, experiences and resources over a period of time can be considered as participants of a CoP. Thus, the use of SNSs within the education context can also be explained in terms of Lave and Wenger's original concept of communities of practice. This is because SNSs have been designed with 'networks' in mind, and naturally, when used for learning, these sites can be aligned to support different communities or groups of learners.

This paper would argue that embedded within any CoP is also the idea of a discourse community; additionally, the discourse community is a logically inseparable piece of the components that make up a CoP. 'Discourse communities' was first coined by John Swales in 1990 and defined as "groups that have goals or purposes and use communication to achieve those goals" (Borg, 2003, p. 398). The term 'discourse community' and its definitions have evolved since first introduced by Swales and it is being replaced by 'community of practice' (Johns, 1997),

which is a much more encompassing sociocultural construct as opposed to a purely linguistics one. Nevertheless, communication remains an important component of a CoP. Here, SNSs shine in its role of enabling the functionalities of CoP as SNSs usually incorporate the latest in communication technologies.

For Wenger and Trayner-Wenger (2015), learning is fundamental to human identity. They see learning as social participation in which an individual becomes an active participant in the practices of the social communities as well as in the construction of his or her own identity through engagement in these communities. Thus, in CoP, learning is seen as occurring through the active participation of the members within the community. When functioning as both a socialising agent and a social platform, SNSs moves the focus from the individuals to the network of social relationships in which they are situated. The value and potential of SNSs for learning within the framework of CoP cannot be understated. Additionally, recent advances in technologies have somewhat turned SNSs into the pinnacle of what computer-mediated communication should be (Herring, 2004). SNSs offer multi-modal, synchronous and asynchronous communication unbound by geographical and temporal boundaries. There is also the added benefit of much cheaper storage technologies that allow these interactions and communications to be archived for later review and consumption. Taking all these into consideration, SNSs can be viewed as a tool that has a lot of potential in education, particularly at the tertiary level as students not only get to be engaged in learning with those within their course or university, but even with students from around the world or experts in their field of study.

2.3. Affordances of SNS for COP in Higher Education

Most SNSs have been created not with educational usage in mind but more of social purposes by their creators. People mainly use SNSs as a way to socialise, particularly to stay in touch or as a way of maintaining their existing relationships (Boyd & Ellison, 2007; Ellison, 2008). In fact, Boyd (2007, p. 5) suggests that SNSs are seen by young people as a space for them ‘to hang out with their friends’. This emphasis on ‘socialising’ has led some educators to perceive the use of SNSs in educational setting as disruptive and distracting to students (Fewkes & McCabe, 2012; Vivian, 2011). Nevertheless, many are of the view that SNSs have potential for learning and can be beneficial when used for teaching and learning (Manca & Ranieri, 2016), particularly when these sites are so popular among students (Ophus & Abbitt, 2009; Schroeder & Greenbowe, 2009). Many among educators have also looked to SNS technology to mediate and enhance their instruction, particularly as a means of promoting active learning among their students (McLoughlin

& Lee, 2007; Selwyn, 2008). This opinion is also supported by Ziegler (2007) who suggested that SNSs can be aligned to re-engage students and motivate them to become active learners and not simply passive observers in the learning process.

However, the scepticism that surrounds the use of SNSs as a learning tool is warranted (Friesen & Lowe, 2012). The many research carried out on the use of technologies and learning in the past few decades have led scholars in education to make the conclusion that a media tool or technology itself does not affect learning among students (Clark, 1991). It is the features of the technology that enable and constrain how the tools can be used for teaching and learning. Hence, when looking at the possibility of their use in educational settings, the affordances of SNSs as part of social technologies to support learning need to be considered. McLoughlin and Lee (2008) explained that social software tools like SNSs can be pedagogical tools because of the features of the tools within the sites that make possible sharing, communication, collaboration, and information discovery to be carried out within them. In addition, Kayri and Cakir (2010) summarised features of SNSs including facilities for sharing of information, creation of a cooperative and collaborative environment and support of active learning and interaction among a few, that would allow these SNSs to support many pedagogical elements of the constructivist approach.

Ellison (2008) highlighted that SNSs are affecting the users in three prominent ways:

i. Firstly, SNSs increase the opportunities to access resources which are embedded within the social relationships managed by the users. This is because SNSs allow users to effectively manage their extended networks in a much simpler way.
ii. Secondly, SNSs act as a ‘social lubricant’; they enable users to interact with people that they might have met in various casual encounters or chance meetings in their daily activities. These interactions may bring positive outcomes for the individuals and communities.
iii. Thirdly, SNSs allow the users to interact with others based on shared interests, problems or life experiences, and displays of support or action can be mobilised and coordinated without much difficulty using these sites.

Taking these into the context of learning at university, use of SNSs would therefore allow students who are connected via the SNS group(s) they join to access shared educational

resources of various formats or gain latest and timely information of their course content easily. The students would also be able to communicate and interact with course-mates or faculty who they have befriended in SNSs beyond class hours, and additionally collaborate on academic work and form communities based on their shared interests. Ultimately, learning can occur outside of class hours and beyond the classroom walls. This is supported by findings in studies on SNSs in the educational setting. For example, Munoz and Towner (2009) in discussing the outcomes of their study, listed various benefits in using SNSs for education related purposes, giving examples of creating a community of learning with classmates, having increased contact outside of class hours with fellow classmates and instructors, convenient access to learning materials, and the increased potential to share information. Munoz and Towner (2009) went on to state that the greatest strength of SNSs such as Facebook is their capability to support and offer students the opportunities to work together and collaborate and learn outside of the classroom. In another study, Gao, Luo and Zhang (2012) draw attention to the potential of Twitter in encouraging student participation, reflective thinking, engagement, and collaborative learning, in addition to expanding learning content in different learning environments. Manca and Ranieri (2016) in their review of research on SNSs in the educational setting reported several opportunities and challenges afforded by SNSs, including issues related to communication between students and teachers/lecturers and the appropriate professional behaviours, as well as pedagogical and technological challenges associated with SNS use in teaching and academic practices.

Literature appears to suggest that the features of SNSs that afford them as having the potential to be used in educational activities fall within five main categories, namely content generation, collaboration, communication and interaction, creation of communities of practice, and sharing of information. Hamid et al. (2015) in their study which reviewed literature on online social networking and higher education also highlighted that SNSs are relevant in four key activities within the academic context, namely content generation, sharing of resources, interaction, and collaboratively socialising.

Goldfarb, Pregibon, Shrem and Zyko (2011) suggest that the unique affordances of online social networking websites make them likely candidates for supporting collaborative work and learning. By facilitating student collaboration, SNSs transform passive learning into active ones and students can form communities within these SNSs to share ideas and resources, resulting in a learning environment that is encouraging and motivating. The term ‘collaboration’ in general invokes the notion of team work, group work, socialising, discussion and interaction, and thus the features of SNSs can be seen to support these types of activities (Collins & Hide, 2010; Rowlands,

Nicholas, Russell, Canty, & Watkinson, 2011). The informality of these sites and students' familiarity with the features within these sites engage the students and increases their participation. Furthermore, the possibility of getting instantaneous help and support from peers for their learning engenders a sense of control over their own learning among the students. Additionally, students who feel intimidated or shy in the classroom could air their queries and views without having to worry about feeling intimidated by others (Goldfarb et al., 2011).

The discussion presented above has pointed out the unique affordances of SNSs for supporting activities required in typical communities of practice. Wenger and Trayner-Wenger (2015) put emphasis on social participation as the keystone to learning, and it is this social aspect that seems to be one of the main strength of SNSs. This paper intends to explore the actual usage of SNSs by Malaysian university students for the purpose of collaboration and formation of communities of practice.

3. METHODOLOGY

The research described in this paper employed quantitative approach to gather data through the survey method. The method was chosen because it is the most appropriate method to gather information on behavioural patterns across a large population (Ary, Jacobs, Razavieh, & Sorensen, 2009). In fact, according to McMillan and Schumacher (2001), one of the most common research methods in education when involving data collection from large numbers of subjects is survey research because surveys are versatile, efficient and generalizable methods of obtaining beliefs, attitudes, traits and other characteristics of a population. In this study, survey research was chosen because it is efficient and convenient when large quantities of information need to be collected (Muijs, 2010). Most of the studies conducted on SNSs and students' usage have utilised the survey method (Ellison, Steinfield, & Lampe, 2007; Roblyer, McDaniel, Webb, Herman, & Witty, 2010; Neil Selwyn, 2009; Valenzuela, Park, & Kee, 2009).

The instrument used in this study is a questionnaire. Two steps were taken to ensure the validity and reliability of the instrument. The first is the use of a panel of experts to evaluate the instrument. The panel was asked to review the design, language and content of the questionnaire in terms of the following aspects: (a) relevance of the items, (b) clarity in wording and ease of understanding, (c) use of standard English and presence of any language errors, (d) representativeness of the elements, (e) presence of any biased words or phrases, (f) formatting of the items, (g) clarity of instructions, and (h) overall look of the questionnaire (Fowler, 2008).

The panel was also asked to provide any other suggestive input or feedback on the survey items. Based on the review, input and feedback provided, changes were made to the instrument before the second step – the pilot test.

Questionnaires are standardised so it is not possible to explain any points in the questions that participants might misinterpret while answering them. However, this could be partially solved by piloting the questions on a small group of students (Mogey, 1999). The pilot test for the instrument was conducted at the Faculty of Social Sciences, Universiti Kebangsaan Malaysia, involving 56 undergraduate and postgraduate students. As this paper focuses on use of SNSs for collaboration and engagement in CoP, the results on test of reliability in Table 1 only present the relevant sections from the pilot test of the questionnaire.

Table 1: *Results for Pilot Test on Collaboration and CoP*

Section/Items	Cronbach's Alpha Value
1. Collaboration	0.87
i. To collaborate with students from other universities doing the same course of study	
ii. To collaborate or work together for an assignment/project with my course-mates	
iii. To work with others in carrying out research activities	
2. Community of Practice (CoP)	0.83
i. To join study groups created by my course-mates	
ii. To join course groups created by my lecturers or supervisors.	
iii. To join groups to build my interest in the subject or course of study	

Based the values obtained, both sections are considered to have good reliability. The interpretation of the Cronbach's Alpha results was carried out based on the guide given by Nunnally (1978) where results with values between 0.9 to 0.8 are said to show 'Good' internal consistency.

The finalised questionnaire was then distributed electronically via SurveyMonkey. A total of 22,582 responses were gathered initially. However, after data cleaning for missing and

incomplete responses as well as checking for outliers, a total of 16,868 valid responses were obtained. The following section presents the findings and relevant discussion.

4. RESULTS

The first set of items presented is the demographic profiles of the respondents. Keeping in mind the importance of contexts as mentioned earlier in the paper, these demographic data will be used for correlating and examining the data obtained for collaboration and engagement in CoP. A meta-analysis on the use of Facebook in education by Wilson, Gosling and Graham (2012) suggested the inclusion of complete demographic variables in order to help readers better understand the analysis.

Table 2: *Basic Demographic Data*

Demographic Info	Category	Frequency (F)	Percentage (%)
Gender	Male	6158	36.5%
	Female	10710	63.5%
Age Group	Between 17 to 20	6003	35.6%
	Between 21 to 24	8861	52.5%
	Between 25 to 30	1200	7.1%
	Between 31 to 35	472	2.8%
	More than 36 years old	332	2.0%
Level of Study	Undergraduates	14347	85.1%
	Postgraduates	1606	9.5%
	Others	915	5.4%
Year of Study	First Year	5946	35.3%
	Second Year	4432	26.3%
	Third Year	2925	17.3%
	Fourth/Final Year	3565	21.1%
Field of Study	Life Sciences and Medicine	1111	6.6%
	Arts and Humanities	2318	13.7%
	Science, Technology, Engineering, Mathematics	7235	42.9%
	Natural Sciences	301	1.8%
	Social Sciences and Management	5903	35.0%
Type of IHL	Public	16254	96.4%
	Private	614	3.6%

The respondents were also asked to provide their Cumulative Grade Point Average (CGPA). This will be termed ‘Reported CGPA’ as there is now way for the authors to ascertain the accuracy of the CGPA provided by the respondents.

Table 3: *Reported CGPA*

Reported CGPA	Frequency	Percentage (%)
3.6 and above (High)	3527	20.9%
3.0 to 3.5 (Average)	9137	54.2%
Below 2.9 (Low)	4204	24.9%
Total	16868	100%

Out of the total 16868 respondents, 207 (1.2%) reported not having any SNS account and these were therefore discounted from further analysis leaving the total N for analysis at 16661. The next sets of data concern the use of SNSs for collaboration and engagement in CoP in order to answer the first question in this paper – How do Malaysian university students collaborate via social networking services?

Table 4: *Frequency Distribution of SNS Use for Collaboration and CoP*

Statement: I use my SNSs	Never		Rarely		Some times		Often		All the Time	
	F	%	F	%	F	%	F	%	F	%
Collaboration										
i. To collaborate with students from other universities doing the same course of study	2539	15.2	3710	22.3	4872	29.2	4081	24.5	1459	8.8
ii. To collaborate or work together for an assignment/project with my course-mates	351	2.1	1000	6.0	3888	23.3	7711	46.3	3711	22.3
iii. To work with others in carrying out research activities	942	5.7	2485	14.9	5707	34.3	5735	34.4	1792	10.8
Community of Practice										
i. To join study groups created by my course-mates	907	5.4	1700	10.2	4476	26.9	6386	38.3	3192	19.2
ii. To join course groups created by my lecturers or supervisors	1150	6.9	1845	11.1	4326	26.0	6129	36.8	3211	19.3
iii. To join groups to build my interest in the subject or course of study	817	4.9	2669	16.0	6702	40.2	5057	30.4	1416	8.5

For purpose of analysis, frequencies for ‘Often’ and ‘All the time’ were combined to indicate high frequency of usage. The highest frequency in Table 4 for the category ‘Collaboration’ is for

the item 'To collaborate or work together for an assignment/project with my course-mates' which stands at 68.6% indicating that more than half of the respondents use SNSs to collaborate with their peers. This is in accord with findings from other studies such as Selwyn's (2009) study where students' academic interaction or collaboration on Facebook was limited to the context of the members within the same course rather than extending beyond that boundary. This leads Selwyn (2009, p. 170) to remark that "…in terms of education-related interaction, Facebook was used primarily for maintaining strong links between people already in relatively tight-knit, emotionally close offline relationships, rather than creating new points of contact with a 'glocalised' community of students from other courses or even institutions". This helps explain the lower score in relation to frequency of use given to the item "To collaborate with students from other universities doing the same course of study" at 33.3% which is the lowest for the category of Collaboration. The collaborative affordances of SNSs have also been noted by other researchers such as Laird and Kuh (2005), Geyer, Filho, Brownholtz, and Redmiles (2008), Johnson, Johnson and Holubec (2008), Al-Rahmi, Othman and Musa (2014) as well as Mondahl and Razmerita (2014).

For the category 'Community of Practice', it is interesting to note that the two top items i.e., "To join study groups created by my course-mates" and "To join course groups created by my lecturers or supervisors" received high scores in relation to frequency of usage at 57.5% and 56.1%, respectively. It seems that more than half of the respondents make frequent use of SNSs to engage in groups that conform to the definition of community of practice. This is unsurprising as the literature seems to agree that the formation of learning groups is one of the definitive strength of SNSs (Cole et al., 2017; Moran, Seaman, & Tinti-Kane, 2011; Shakoori, Mahboob, Strivens, & Willis, 2017). In fact, Krutka, Nowell and McMahon (2017, p. 235) noted that "The affordances of social media can both enhance traditional lessons and provide opportunities for teachers and students to grow professionally", which seems to be the case here as respondents join groups created by their peers as well as their lecturers, enhancing the cooperation beyond the boundaries of the traditional classrooms.

The next step in the data analysis process involved carrying out assumption tests to prepare for statistical analysis to determine differences in gender, level of study and reported CGPA in relation to frequency of SNS use for Collaboration and CoP. These assumption tests included Kolmogorov-Smirnov's Test for normality and Levene's Test for equality of variances. Additionally, outliers were first checked using boxplots and inspection of the mean and trimmed mean, and then manually checked to ensure they were not caused by data entry or coding errors.

The following sections present the results based on gender, level of study and reported CGPA in relation to frequency of SNS use for Collaboration and CoP in detail.

4.1. Gender: Collaboration

The following presents the results of the independent samples t-test for frequency of SNS use for 'Collaboration' based on gender. Table 5 presents the mean and SD for both female and male group, including the Levene's test result.

Table 5: *Mean, SD and Levene's Test Results for Frequency of SNS Use for Collaboration based on Gender*

Frequency of SNS use for	Gender	N	Mean	SD	Levene's Test for Equality of Variances
Collaboration	Male	6053	3.28	0.82	F 3.273
	Female	10608	3.36	0.84	Sig. 0.070

Frequency of SNS use for learning in terms of 'Collaboration' was slightly higher for female (M=3.36, SD 0.84) compared to the male respondents (M=3.28, SD= 0.82), as presented in Table 5. For scores on 'Collaboration', the variances for male and female were equal, F (1, 16659) = 3.273, p=0.070. There was homogeneity of variances as assessed by Levene's test for equality of variances (p=0.070). Table 6 presents the results of the independent samples t-test.

Table 6: *Results of t-test for Frequency of SNS Use for Collaboration based on Gender*

Frequency of SNS use for	t-test for Equality of Means						
	t	df	Sig. (2 tailed)	*M* (Mean Diff)	SE	95% CI	
						Lower	Upper
Collaboration	5.868	16659	.000	0.07879	0.01343	0.05247	0.10511

As shown in Table 6, female mean score for frequency of SNSs use for learning in terms of 'Collaboration' was 0.08 (SE= 0.013) higher than male mean score. There was a statistically significant difference in mean score for frequency of use of SNSs for 'Collaboration' between females and males, with females scoring higher than males, M=0.08, 95% CI [0.05, 0.11], t (16659) = 5.868, p= 0.0001. Based on the results of the independent samples t-test, Cohen's *d*

effect size was calculated to determine the strength of the difference. The result is presented in Table 7.

Table 7: *Results and Interpretation of Cohen's d for Frequency of SNS Use for Collaboration based on Gender*

Groups	Cohen's *d* effect size	Strength of Effect Size
Female*Male	0.10	Very small effect

A statistically significant difference was found in the frequency of SNS use for learning in terms of 'Collaboration' between the male and female groups. However, Cohen's *d*= 0.10 showed that the effect size was very small and might not have any meaningful practical effect.

4.2 Gender: Community of Practice (CoP)

The following section presents the results of the independent samples t-test for frequency of SNS use for 'CoP' based on gender. First, the mean and SD for both female and male group, and the result of Levene's test of variances are presented in Table 8.

Table 8: *Mean, SD and Levene's Test Results for Frequency of SNS Use for CoP based on Gender*

Frequency of SNS use for	Gender	N	Mean	SD	Levene's Test for Equality of Variances
Community of Practice (CoP)	Male	6053	3.37	0.85	F 5.901
	Female	10608	3.46	0.84	Sig. 0.015

As shown in Table 8, frequency of SNS use for CoP was slightly higher for female respondents (M=3.46, SD 0.84) in comparison to male respondents (M=3.37, SD= 0.85). For scores on 'CoP', the variances for male and female were unequal, F (1, 16659) = 5.901, p=0.015. Levene's test result indicated that homogeneity of variances was violated, p=0.015. Thus, the result of the Welch t-test was consulted for 'CoP' and gender. Table 9 presents the results of the Welch t-test.

Table 9: *Results of Welch t-test for Frequency of SNS Use for CoP based on Gender*

Frequency of SNS use for	Welch t-test for Equality of Means						
	t	df	Sig. (2 tailed)	*M* (Mean Diff)	SE	95% CI	
						Lower	Upper
Community of Practice (CoP)	6.877	12791.630	0.000	0.09319	0.01355	0.06663	0.11976

Female mean score for frequency of SNS use for CoP was 0.09 (SE= 0.014) higher than male mean score. There was a statistically significant difference in mean score for frequency of SNS use for learning for the category 'CoP' between females and males, with females scoring higher than males, M=0.09, 95% CI [0.07, 0.012], t (12791.630) = 6.877, p= 0.0001. Since the Welch t-test showed statistically significant difference, Cohen's *d* was calculated to determine the strength of the difference. The result and interpretation of effect size strength are presented in Table 10.

Table 10: *Results and Interpretation of Cohen's d for Frequency of SNS Use for CoP based on Gender*

Groups	Cohen's *d* effect size	Strength of Effect Size
Female*Male	0.11	Very small effect

Cohen's *d*=0.11 revealed that even though statistically significant difference was found in the frequency of SNS use for 'CoP' between the male and female groups, the effect size was very small to have any meaningful practical effect similar to Cohen's *d* value for Gender and Collaboration.

4.3 Level of Study: Collaboration and CoP

This section presents frequency of SNS use for collaboration and CoP based on the respondents' level of study. The analysis was carried out to determine both statistical difference and the effect size. For 'Level of Study', the respondents were categorised into three groups, namely 'Others' (Matriculation and Foundation), 'Undergraduate' (Diploma, Advanced Diploma and Bachelor's degree), and 'Postgraduate' (Master's and Doctorate degree). Since data involved three groups, the one-way One-way Analysis of Variance (ANOVA) test was selected for the method of analysis. However, Levene's tests results were found to be significant for both categories (p=0.0001), indicating the assumption of homogeneity of variances is violated. Therefore, the one-way ANOVA results are presented here based on Welch ANOVA. Table 11 shows the mean and

standard distribution (SD) for frequency of SNS use for collaboration and CoP based on the respondents' level of study.

Table 11: *Mean and SD Score for Frequency of SNS Use for Collaboration and CoP based on Level of Study*

Frequency of SNS Use for	Level of Study	Mean (SD)	SD
Collaboration	Others	3.29	0.86
	Undergraduate	3.36	0.81
	Postgraduate	3.15	0.97
	Total	3.33	0.83
CoP	Others	3.38	0.89
	Undergraduate	3.45	0.82
	Postgraduate	3.21	0.98
	Total	3.42	0.85

Table 11 shows that the mean scores for frequency of SNS use for 'Collaboration' ranked for from lowest to highest are as follows: 'Postgraduate' group (M=3.15, SD=0.97), 'Others' group (M=3.29, SD=0.84) and the 'Undergraduate' group (M=3.36, SD=0.81). In comparison to the total mean score for all three groups (M=3.33, SD=0.83), the 'Undergraduate' group scored slightly higher, while the mean score of the 'Postgraduate' (M=3.15, SD=0.97) was much lower and for the 'Others' group (M=3.29, SD=0.84), it was only slightly lower.

Similarly, results show that the pattern of increment of mean score for frequency of SNS use for CoP increased from the 'Postgraduate' group (M=3.21, SD=0.98) to the 'Others' group (M=3.38, SD=0.89) and the 'Undergraduate' group (M=3.45, SD=0.82), in that order. Comparison between each of the groups and the total mean score (M=3.42, SD=0.85) revealed that the 'Undergraduate' group scored slightly higher mean (M=3.45, SD=0.82) while the mean score of the 'Others' group (M=3.38, SD=0.89) was slightly lower and the 'Postgraduate' group's mean score (M=3.21, SD=0.98) was much lower. Table 12 presents the results of the Welch ANOVA for frequency of SNS use for collaboration and CoP based on the respondents' level of study.

Table 12: *Results of Welch ANOVA Test for Frequency of SNS Use for Collaboration and CoP based on Level of Study*

	Welch's F^a	df1	df2	Sig.
Collaboration	34.180	2	1727.970	.000

Community of Practice	44.621	2	1720.805	.000

The results shown in Table 12 indicated that frequency of SNS use for collaboration and CoP was statistically significantly different for the three groups based on level of study. Specifically, for collaboration Welch's F (2, 1728.317) = 34.180, p=0.0001 while for CoP, Welch's F (2, 1720.805) = 44.621, p=0.0001; the results indicated the frequency of SNS use for collaboration and CoP differed among the Others, Undergraduate and Postgraduate groups.

Subsequently, post-hoc test was carried out to determine which groups differed as Welch ANOVA showed statistically significant differences were found among the three groups. The Games Howell post hoc test was carried out and the results are shown in Table 13 and 14 for collaboration and CoP, respectively.

Table 13: *Results of Games Howell Post Hoc Test for Frequency of SNS Use for Collaboration based on Level of Study*

Collaboration				95% Confidence Level	
(I) Level of Study	(J) Level of Study	Mean Difference (I-J)	Sig.	Lower Bound	Upper Bound
Others	Undergraduate	-.06886*	.049	-.1376	-.0001
	Postgraduate	.13433*	.001	.0466	.2221
Undergraduate	Others	.06886*	.049	.0001	.1376
	Postgraduate	.20319*	.000	.1441	.2623
Postgraduate	Others	-.13433*	.001	-.2221	-.0466
	Undergraduate	-.20319*	.000	-.2623	-.1441

Table 14: *Results of Games Howell Post Hoc Test for Frequency of SNS Use for CoP based on Level of Study*

CoP				95% Confidence Level	
(I) Level of Study	(J) Level of Study	Mean Difference (I-J)	Sig.	Lower Bound	Upper Bound
Others	Undergraduate	-.06771	.068	-.1392	.0038
	Postgraduate	.17081*	.000	.0803	.2614
Undergraduate	Others	.06771	.068	-.0038	.1392
	Postgraduate	.23852*	.000	.1784	.2987

Postgraduate	Others	-.17081*	.000	-.2614	-.0803
	Undergraduate	-.23852*	.000	-.2987	-.1784

* The mean difference is significant at the 0.05 level

The results of the post hoc test in Table 13 showed that significant differences in relation to frequency of SNS use for collaboration were found between all three pairs of groups with $p<0.05$. In contrast, in Table 14, statistically significant differences were only found for the pairs of 'Others' and 'Postgraduate' group with $p=0.0001$ and the pairs of Undergraduate' and 'Postgraduate' group with $p=0.0001$ in relation to frequency of SNS use for CoP. Based on the post-hoc test results, the next step in the analysis involved determining the effect sizes for the group pairs where statistically significant differences were found. The results for Cohen's *d* for these pairs in terms of frequency of SNS use for collaboration are displayed in Table 15 and for CoP, the results are presented in Table 16.

Table 15: *Results and Interpretation of Cohen's d for Frequency of SNS Use for Collaboration based on Level of Study*

Groups	Cohen's *d* effect size	Strength of Effect Size
Undergraduate*Others	0.08	Very small effect
Undergraduate*Postgraduate	0.24	Small effect
Others*Postgraduate	0.15	Very small effect

Table 16: *Results and Interpretation of Cohen's d for Frequency of SNS Use for CoP based on Level of Study*

Groups	Cohen's *d* effect size	Strength of Effect Size
Undergraduate*Postgraduate	0.27	Small effect
Others*Postgraduate	0.18	Very small effect

As observed in Table 15 and 16, most of the pairs show very small effect size in relation to the differences in their frequency of SNS use for collaboration and CoP. However, the most notable result as observed through the data presented above is that while statistically significant differences were found for most of the group pairs, only the Undergraduate-Postgraduate pair showed effect size that could be meaningful or significant practically ($d = 0.24$ for Collaboration, $d = 0.27$ for CoP).

4.4 Reported CGPA: Collaboration and CoP

Similar procedures were carried out to determine if the reported CGPA of the respondents have any effect on their frequency of SNS use for collaboration and engagement in CoP. The first step in the analysis was to determine if there were any statistical differences in frequency of SNS use for collaboration and CoP for the groups based on their reported CGPA. This was then followed by running the post hoc test to determine in which group pairs the differences were found, and finally calculating the effect size using Cohen's *d* for the pairs with statistically significant results. The respondents were categorised into three groups based on their CGPA results as reported in the questionnaire, namely 'High' (CGPA above 3.6), 'Average' (CGPA between 3.0 to 3.5) and 'Low' (CGPA below 2.9). Table 17 shows the mean and standard distribution (SD) for frequency of SNS use for collaboration and CoP based on the respondents' reported CGPA.

Table 17 *Mean and SD Score for Frequency of SNS Use for Collaboration and CoP based on Reported CGPA*

Frequency of SNS Use for	Reported CGPA	Mean (SD)	SD
Collaboration	High	3.27	0.86
	Average	3.37	0.82
	Low	3.30	0.83
	Total	3.33	0.83
CoP	High	3.37	0.87
	Average	3.46	0.83
	Low	3.39	0.85
	Total	3.43	0.85

Table 17 shows that the pattern of mean score increment for frequency of SNS use for 'Collaboration' is from the 'High' group (M=3.27, SD=0.86), to 'Low' group (M=3.30, SD=0.83) and the 'Average' group (M=3.37, SD=0.82) of reported CGPA. Compared to the total mean score for all three groups (M=3.33, SD=0.83), the 'Average' group (M=3.37, SD=0.82) scored slightly higher mean, while the 'High' group (M=3.27, SD=0.86) scored much lower and the 'Low' group (M=3.30, SD=0.83) had only slightly lower mean.

Similarly, the results show that for frequency of SNS use for CoP, the mean score increased from the 'High' group (M=3.37, SD=0.87) to the 'Low' group (M=3.39, SD=0.85) and the 'Average' group (M=3.46, SD=0.83) of reported CGPA, in that order. In comparison to the total mean score (M=3.43, SD=0.85), the results revealed that the 'Average' group scored slightly

higher mean (M=3.46, SD=0.83) while the mean score of the 'Low' group (M=3.39, SD=0.85) was slightly lower and the 'High' group (M=3.37, SD=0.87) had much lower mean score.

The result of the Levene's test led to the use of Welch ANOVA test for Collaboration as the assumption of homogeneity of variances was violated for 'Collaboration' with F (2, 16658) = 4.891, p=0.008. While for CoP, ANOVA test was consulted as assumption of homogeneity of variances was met with 'CoP' F (2, 16658) = 1.914, p=0.147. Table 18 presents the results of Welch ANOVA for frequency of SNS use for collaboration based on reported CGPA while Table 19 presents the results of the ANOVA test for frequency of SNS use for CoP based on reported CGPA.

Table 18 *Results of Welch ANOVA Test for Frequency of SNS Use for Collaboration based on Reported CGPA*

	Welch's *F*[a]	df1	df2	Sig.
Collaboration	22.321	2	7742.322	.000

a. Asymptotically F distributed.

Table 19: *Results of ANOVA Test for Frequency of SNS Use for CoP based on Reported CGPA*

CoP	Sum of Squares	df	Mean Square	F	Sig. (p)
Between Groups	28.114	2	14.057	19.643	.000
Within Groups	11920.790	16658	0.716		
Total	11948.904	16660			

Welch ANOVA results in Table 18 indicate that the frequency of SNS use for 'Collaboration' is statistically significantly different for the different groups of reported CGPA, where p=0.0001. Specifically, for 'Collaboration' Welch's F (2, 7742.322) = 22.321, p=0.0001. Correspondingly, the results from the ANOVA test in Table 19 indicate that frequency of SNS use for 'CoP' is statistically significantly different for the three groups of reported CGPA, F (2, 16658) = 19.643, p=0.0001. The results indicate that the reported CGPA groups' frequency of SNS use for collaboration and CoP differed significantly.

The next step involved identifying which groups differed as the Welch ANOVA for collaboration and ANOVA results for CoP showed statistically significant differences were found

among the three groups. Post hoc test was carried out and the results are shown in Table 20 and 21 for collaboration and CoP, respectively.

Table 20: *Results of Games Howell Post Hoc Test for Frequency of SNS Use for Collaboration Based on Reported CGPA*

Collaboration				95% Confidence Level	
(I) Reported CGPA	(J) Reported CGPA	Mean Difference (I-J)	Sig.	Lower Bound	Upper Bound
High	Average	-0.10447*	.000	-0.1442	-0.0648
	Low	-0.03880	.115	-0.0845	0.0069
Average	High	0.10447*	.000	0.0648	0.1442
	Low	0.06567*	.000	0.0291	0.1022
Low	High	0.03880	.115	-0.0069	0.0845
	Average	-0.06567*	.000	-0.1022	-0.0291

*Significant at the 0.05 value

Table 21: *Results of Tukey HSD Post Hoc Test for Frequency of SNS Use for CoP based on Reported CGPA*

Community of Practice (CoP)				95% Confidence Level	
(I) Reported CGPA	(J) Reported CGPA	Mean Difference (I-J)	Sig.	Lower Bound	Upper Bound
High	Average	-0.09270*	.000	-0.1322	-0.0531
	Low	-0.02115	.522	-0.0668	0.0245
Average	High	0.09270*	.000	0.0531	0.1322
	Low	0.07155*	.000	0.0343	0.1088
Low	High	0.02115	.522	-0.0245	0.0668
	Average	-0.07155*	.000	-0.1088	-0.0343

The results of the Games-Howell post hoc test in Table 20 show statistically significant difference can be observed for only two pairs, namely the 'Average' and 'High' group, and between the 'Low' and 'High' group with p=0.0001. However, mean comparison between the 'Low' group and the 'High' group of reported CGPA was not statistically significant with p=0.115.

Equally, Tukey's post hoc analysis in Table 21 shows difference in mean increase that was statistically significant for only two pairs of reported CGPA group with p =0.0001. However, mean

comparison between the 'Low' group and the 'High' group was not statistically significant with p=0.522.

For collaboration and CoP, the post-hoc test results revealed statistically significant differences for two pairs of reported CGPA groups. Thus, the next step in the analysis involved calculating the effect size for the two pairs of groups. The results for Cohen's d for these pairs in terms of frequency of SNS use for collaboration are displayed in Table 22 and for CoP, the results are presented in Table 23.

Table 22: *Results and Interpretation of Cohen's d for Frequency of SNS Use for Collaboration based on Reported CGPA*

Groups	Cohen's *d* Effect Size	Strength of Effect Size
Average*High	0.12	Very Small Effect
Average*Low	0.09	Very Small Effect

Table 21: *Results and Interpretation of Cohen's d for Frequency of SNS Use for CoP based on Reported CGPA*

Groups	Cohen's *d* Effect Size	Strength of Effect Size
Average*High	0.11	Very Small Effect
Average*Low	0.08	Very Small Effect

The results in this section show that statistically significant differences were found in the frequency of SNS use for collaboration and CoP between the reported CGPA groups. However, Cohen's *d* values shown in Tables 22 and 23 indicate that the strength of the effect size for the pairs were very small. This suggests that although the differences in frequency of SNS use are statistically significant, they may not have any practical significance.

5. DISCUSSION

Findings show that the variable with the most notable pair where statistically significant as well as sufficient strength of effect size were found is Level of Study, specifically for the Undergraduate-Postgraduate group pair (Cohen's *d* for Collaboration *d* = 0.27 and CoP *d* = 0.24). Effect size is given importance here as Coe (2002) argued that research reports rarely state effect size and that effect size is the "true measure of the significance of the difference". Sullivan and Feinn (2012) further argued for the reporting of the effect size in an article's Abstract and Results sections

which they believe is more important and informative than only significance as displayed by the value *P*. Aarts, Van Den Akker and Winkens (2014) gave two specific conditions under which the effect size is more important and useful than statistical significance. The first is that when the significance is not meant to be generalised to the whole population as in the exploratory study reported in this paper. The second condition is when the sample size is too small or too big; once again, it is a condition fulfilled by this study as the valid sample size is 16661. Based on the arguments presented, the discussion will zoom in directly to the most pertinent of the results.

The most logical explanation for the difference between undergraduate and postgraduate students lies in the different nature of their studies, as well as possibly different styles of learning between the two levels (Shukr, Zainab, & Rana, 2013). Postgraduate studies in Malaysia are mostly research-oriented and most postgraduate students carry out research individually. They would be a better fit for Wenger's example of Impressionists artists who get together to discuss their styles and inventions but would go on to paint alone. This contrasts with the normal practice for undergraduates where some work is to be carried out and assessed as a group. This could explain the higher use of SNSs for collaboration and CoP by the undergraduates. Nagel, Ramillard, Aucoin and Takenishi (2018) noted the differences in SNS use habits and perception at different levels of study. Their study did not look at specific uses for learning; it however suggests that practical pedagogical considerations based on factors like levels of study may need to be taken into account in order to use SNSs effectively in education.

Another plausible explanation is the age factor. Most Malaysian postgraduate students are older than their undergraduate counterparts, and this is likely true in other countries as well. Several studies have noted the role that age plays in the usage patterns of social media (Madden & Savage, 2000; Wilson et al., 2012); yet, where it concerns education, age factor seems to be relatively insignificant (Ementa & Ile, 2015). Cha (2010) reported that younger undergraduates use social media more frequently, but do not necessarily spend more time on it. Brown and Czerniewicz (2010) further argued that age is not the dividing factor, but rather access and opportunity.

The findings show that the variables of Gender and Reported CGPA have some statistical significance with female and average reported CGPA students using SNSs more frequently for collaboration and CoP; however without adequate effect size, they do not warrant an in-depth discussion in this paper. Research does point out to differences between the genders in using

social media (Herring & Paollillo, 2006; Wang, Burke, & Kraut, 2013); however, the pattern discovered by this study does not support practical difference in terms of SNS use for collaboration and CoP. Similarly, the respondents' academic performance in their Reported CGPA does not carry adequate effect size to be practically meaningful within the scope of SNSs use for collaboration and CoP. However, this does not mean that top-performing students do not differ in their use of technology. An earlier research by the authors discovered that while the patterns of SNSs use were found to be similar between the low and high performing groups of students, the high performers tend to make more use of e-mail compared to SNSs (Hamat, Embi, & Hassan, 2013).

6. CONCLUSION

This paper reports on the findings of an explorative study to investigate how Malaysian university students use SNSs for collaboration and engagement in communities of practice. The results of the survey which sought to discover the patterns of SNS use reveal that undergraduate students use SNSs for collaboration and CoP more than the postgraduate students. This suggests that the implementation of SNSs in any academic programmes must take into account the different levels of study possibly due to the variations in academic requirements as well as the learning styles and techniques relevant to these requirements. This study managed to point out patterns in the larger population of Malaysian university students. Future research could use the patterns discovered as starting points for more in depth studies in order to explain the differences and variations in use of SNSs among students in Malaysian higher education.

6.1. Availability of data and material

The datasets generated and/or analysed during the current study are not publicly available due to the sponsoring institution's data access policies but are available from the corresponding author on reasonable request.

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