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Use of Social Media to Enhance Personal Learning Environment in Learning of Statistics

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Abstract: *A Personal Learning Environment (PLE) has been discussed from the past few years as PLE empowers students to take charge of their own learning to match their personal learning style and pace. Many students in tertiary education face difficulties in learning statistics and mathematical skills because of its complexity, lack of self-motivations and learning supports. The objective of this study is to verify on how online learning tools such as social media can serve as platforms for PLE integrating both formal and informal learning and fostering self-regulated learning for statistics learners. A survey questionnaire was tested among students from a private university. Likert-scale type format and open-ended question were used. Findings from this study show that most learners are accessing internet. However, its use for learning was still low and required further improvement. Spending more time in social network was found correlated with receiving a stronger intrinsic motivation. Instructors should use social media integrated in the LMS with interesting course content. Results from this pilot study have contributed to the questionnaire for future full implementation.*

Keywords: Higher Education, Learning Management System (LMS), Open & Distance Learning (ODL), Personal Learning Environment (PLE), Social Media

1. INTRODUCTION

In order to enhance learning, universities are administrating Learning Management Systems (LMS), which has become an indispensable part of the most of the traditional courses (Pilli, 2014). There are various e-learning platforms with the most popular were closed, standardised platforms, some of them free of charge - Moodle, and others paying - Blackboard and in Italyi Docebo (Bruno & DeNotaris, 2013). Recent innovative technologies e.g. social software represent something closer to personalize learning (Wilson, Liber, Johnson, Beauvoir, Sharples & Milligan, 2006). Statistics is an important subject among business students for undergraduate and above studies. The subject provides the basic skills to use as analytical tools. However, many students in tertiary education face difficulties in learning statistics and mathematical skills because of its complexity, lack of self-motivations and learning supports. The objective of this study is to verify the impact of PLE using social media for statistic learner. This research will reflect the (a) level of participation of learners in social network; (b) usefulness of online platform and social media; (c) perception of Social Media for Personal Learning and (d) difference in intrinsic motivation, supports, satisfaction, and level of participation.

2. LITERATURE REVIEW

2.1. Social Media Use in Higher Education

Social media is a 21st century term used to broadly define a variety of networked tools or technologies that emphasize the social aspects of the Internet, and is often interchangeable with the terms Web 2.0 and social software (Dabbagh & Reo, 2011a). Examples of social media such as Delicious, WordPress, and Twitter; wiki software such as PBworks; media sharing tools such as Flickr and YouTube; social networking sites (SNS) such as Facebook and LinkedIn; and web-based office tools such as Google Apps (Dabbagh & Reo, 2011b; Kitsantas & Dabbagh, 2010). The 2010 ECAR (EDUCAUSE Centre for Applied Research) study revealed that students' use of social media has steadily increased (Smith & Caruso, 2010). Furthermore, social media has been used by many

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college faculties to support teaching and learning activities (EDUCAUSE Learning Initiative, 2007). Based on Moran, Seaman and Tinti-Kane (2011), an increasing number of faculty members are using social media, with videos from YouTube being rated as the most valued way for teaching.

Social networking tool has both its advantages and issues (Hoffman, 2009). Thus, it is the pedagogical aspect which needs innovative idea as pointed by Lee and McGloughlin (2010). Munoz and Towner (2009) concur that social network tool can increase interaction. According to Martin (2009), students who are heavily engage in social networking do just as well academically as students who are less interested. These have shown that using social media to support teaching and learning would be able to provide engagement, interactions and interest to the learners. Nevertheless it would motivate the learners to be actively participating in social media learning.

2.2. PLEs and Social Media

The EDUCAUSE Learning Initiative (ELI) (2009) defines PLEs as the "tools, communities, and services that constitute the individual educational platforms that learners use to direct their own learning and pursue educational goals" (p. 1). Rubin (2010) and McGloughlin and Lee (2010) posit that PLEs empower students to take charge of their own learning. These definitions and conceptual descriptions imply that PLEs can be perceived as both a technology and a pedagogical approach that is student-designed around each student's goals or a learning approach (Johnson, Adams, & Haywood, 2011). Tishkovskaya and Lancaster (2012) clarified that web-based learning can be seen as an alternative and complimentary tool in statistics education. Clark, Logan, Luckin, Mee, and Oliver (2009) showed that students were not fully taking advantage of the benefits that Web 2.0 technologies. Similarly, Cigognini, Pettenati, and Edirisingha (2011) reported that learners need support, guidance, and pedagogical interventions to make the best possible use of social media. PLEs are premised on social media and steadily gaining ground in the e-learning field. Martindale and Dowdy (2010) posit that PLEs are an outcome that social media has provided. PLEs are built on externally hosted Web 2.0 to help students aggregate and share resources, participate in collective knowledge generation, and manage their own meaning making (Dabbagh & Reo, 2011b; Dron, 2007).

According to Wang, Chung, Park, Mclaughlin and Fulk (2011) the higher the intrinsic motivation, the more likely an individual is to perceive being part of an online community as free of effort and goal fulfilling and to actually spend time there. Furthermore, Results from Gao, Dai, Fan and Kang (2010) show that sociability is also influenced by support for interaction. Yu, Tian, Vogel, and Kwok (2010) also argued that social network sites could help students learning about their peers and college which, in turn, could create satisfaction and affiliation with the University. Hence, using social media for self-learning can provide great advantage in sharing and take charge of their own learning to achieve learning goals.

2.3. Mathematics and Statistic Education

Mathematics has been regarded by learners historically as one of the many difficult courses or "high-risk" courses. Many believe that technical subjects including mathematics cannot be delivered 100% via online. According to Engelbrecht and Harding (2004), this could be due to the inability of the Internet. Oates (2009) also said that the effective integration of technology into teaching and learning of mathematics poses a significant challenge. However, Weems (2002) found that there was no significant difference between the achievements of both groups of students. A similar research conducted by Ryan (2001) on the Introductory Mathematics subject also yielded the same result. According to Haapala, Pietarinen, Rautopuro and Väisänen (2002), there are some other factors like prior knowledge, mathematical self-confidence and statistics anxiety, which predict the learning outcomes.

Cruise and Bolton (1985) identified six components of statistics anxiety. Procrastination was positively related to statistics anxiety (Rodarte-Luna & Sherry, 2008). Lovett and Greenhouse (2000) laid out the principles describing the processes of learning. Statistics educators should think about and continually assess their personal theories of learning and teaching (Garfield, 1995). On the other hand, Makwakwa (2012) found the probable causes of learners' difficulties. Schau and Mattern (1997) indicated difference between propositional knowledge and conceptual understanding, and what they have established that might be the existence of propositional knowledge rather than conceptual understanding. Research (Roberts 1999; Schau & Mattern 1997) appears to show concept maps to be useful tools in statistics.

Gal and Ginsburg (1994) found that approaches towards assessing attitudes towards statistics are ill-suited. Moreover, the negative attitudes are highly resistant to change (Birenbaum & Eylath 1994). Therefore, Gordon (1995) explored the challenge that enabled students to view statistics as meaningful and useful knowledge. Harraway and Barker (2005) pointed deficiencies in statistical preparation for employment. In summary, learning statistics and mathematical concepts requires knowledge supports and techniques. This will motivate students that mathematics and statistics are meaningful and useful knowledge in their future applications.

2.4. Teaching Aids

The use of teaching aids or technologies in teaching and learning needs to be addressed because it will affect the outcomes of teaching and learning. Although the Content Knowledge is the most vital one among the three types of knowledge put forward by Mishra & Koehler (2006) and any teaching and learning must focus on content, yet in order to ensure the success of integrating technology into teaching and learning, students will need Technological Content Knowledge (TCK) whereas teachers or lecturers will need Technological Pedagogical Content Knowledge (TPCK). Moore (1997) too felt strongly that heavy use of computing technology is essential for realistic learning of practical statistics.

Oates (2009) also strongly supported the use of technologies will affect the outcomes of teaching and learning of mathematics. Baker and Sugden (2003) pointed out that spreadsheet has potential to become a universal tool for teaching and learning mathematics. Malkowshy (2004) stated that visualization and animation are very important methods in the study of mathematical concepts. As reported by Mayer (2001), the use of animation and multimedia produced a greater learning outcome. Lee and Rha (2009) also agreed with the results where students who were exposed to interactive materials achieved higher scores in examination. E-book can be defined as a book presented in electronic or digital format (Smith & Kukulska-Hulme, 2012).

According to Appleton (2005, p.56) the next resource to embed into e-learning would be the e-book (Guan, 2009). The Ministry of Education has allocated more than RM1.04 million to finance university libraries' subscription to the netLibrary in 2010 (Letchumanan & Tarmizi, 2011). On the other hand, the e-book designs need to be considered when adopting e-book as instructional materials (Lim, Hong & Aziz, 2014). Hence, e-books can be customized by instructors (Wong, Liong, Lin, Lower & Lam, 2011). The use of Hyper Text Markup Language (HTML) compiler enables e-books made it possible to create a new learning experience (Lai & Newby, 2012). Nevertheless, placing students in a new situation to learn statistics, particularly in different media representation in e-books, could have had a confusing and distracting effect on them before they could get used to the new learning environment (Clark & Mayer, 2011). As a result, the use of computing technologies and instructional materials with interactive multimedia has indeed generated the interest among the learners and instructors in mathematics and statistics education as well as improve examination results.

2.5. Online Learning Platforms

Dinov, Sanchez, and Christou (2008) reported that the SOCR provided a number of interactive tools for self-learning and to complete assignments. Suanpang, Petocz, and Kalceff (2004) concluded that students taught online develop strongly positive attitudes towards learning statistics. Furthermore, based on Tishkovskaya and Lancaster (2012), web-based learning could be seen as an alternative and complimentary tool. Nevertheless, Chong, Go, Koay and Lee (2010) found that students know how to use computer in general, but the use of computer for learning mathematics is still low. Specifically, Neumann and Hood (2009) found that student engagement, may be enhanced when a wiki is used to support learning. Use of social media has become an integral part of the college experience. Literatures such as Nihalani and Mayrath (2010) reported the effective uses of iPhone and iPod touch applications in education. In other words, use of smart electronics devices to access interactive tools in online learning platforms can motivate the student with positive attitudes towards learning of subjects such as statistics.

2.6. Pedagogical Model Used at a Private University

In the case of a selected private university, students who are taking statistic course have completed one semester of study at university where they were taught on the various learning skills in a blended learning environment. The lecturer will use the PowerPoint slides to guide the learners. These slides are then uploaded into the system. Tutorial questions are also uploaded into the LMS. The discussion group is created in the LMS and learners'

names are added into the group. The tutor will discuss the solution in the tutorial session.

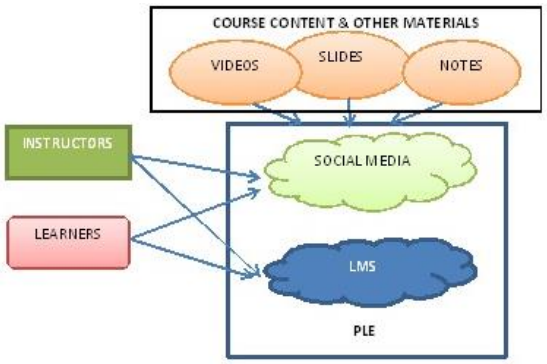

Figure 1. Teaching Pedagogy Model Using Social Network

Figure 1 shows the model of teaching pedagogy using social network tools. Students of the private university are able to access to its own learning management system (LMS). Students can access to this learning management system anytime and anywhere to download video clips and slides according as well as related notes of each topic. The pedagogy used in teaching and learning statistics with the use of social network tools includes: (i) YouTube and (ii) Facebook. A conceptual model of social network adoption to enhance personal learning environment is illustrated in Figure 2.

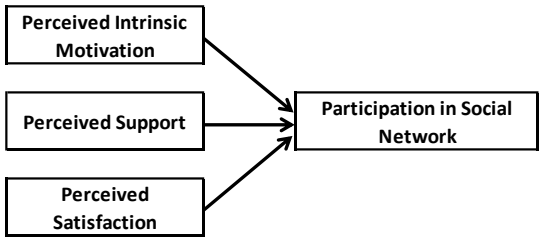

Figure 2. Research Conceptual Model

This study proposes that perceived intrinsic motivation, perceived support and perceived satisfaction of using social media accelerate the adoption of social network to enhance personal learning environment.

3. METHODOLOGY

This study uses survey research to collect information from the student. Likert-scale type format was applied for questions on students' adoption of social media to enhance PLE. Questions on demographic background use ordinal and nominal scales. The structured questionnaire includes an open-ended question at the end of closed-ended questions for eliciting comments about the respondents' adoption of social media for PLE. This pilot study was carried by means of questionnaires to the students at the Faculty of Business and Finance in a non-for-profit private university in Perak, Malaysia. The purpose of this pilot study is to find out the PLE preferences of these statistics students. The survey questionnaires were distributed to 81 undergraduate students during tutorial classes of quantitative techniques from 10-16 April 2015.

4. FINDINGS AND DISCUSSION

4.1. Respondents' Demographic Factors

Internal consistency of the instrument is measured with Cronbach's alpha. The alpha reliability was highly accepted (alpha = 0.857). A total of 81 responses were received. Most of the participants are from accounting programme (27%). The respondents of this study were almost evenly distributed between genders. Of this total, 34 are Male respondents (42%) compared to 47 Female (58%). Table 1 shows the distribution of the respondents according to age.

Table 1. Distribution according to age

Age	Freq.	%
19	3	3.7
20	48	59.3
21	18	22.2
22	8	9.9
23	3	3.7
24	0	0.0
25	1	1.2

In terms of age group, majority of the respondents were found to be in the 19 to 20 age group with 51 respondents (63%), followed by 30 respondents (37%) in the 21 to 25 age group.

4.2. Use of Internet, Social Networks, and Online Platform

The number of hours per day spent on accessing the internet is more than three hours category by 54 (66.7%) respondents compared to 2-3 hours per day category by 24 (29.6%) respondents, and less than 1 hour category by 3 respondents (3.7%). For the tendency of internet services, majority of the respondent is inclining towards social networks (75.3%) than entertainment (19.8%) or education (4.9%). The level of participation is defined as the number of hours spent per day in the social network. The number of hours spent per day has been mentioned above where majority (46.9%) was found to be spending between two to three hours per day compared to the number of hours per day spent on social network is more than three hours category is 31 respondents (38.3%). Less than one hour category is found to be 12 respondents (14.8%).

Thus, learners' participation in the social media is high. On PLE, majority of the respondent think that it is good idea and they like it (76.5%), good idea and don't like it (9.9%), not a good idea (4.9) and others (8.6%). Regarding the effect of online learning platform, majority (44%) of the respondents agreed on its usefulness on personal learning. Regarding the effect of social media, majority (89%) of the respondents agreed on its usefulness on personal learning. In short, most of the respondents spend more than three hours accessing the internet with inclination towards social networks for its usefulness on personal learning.

4.3. Perception of Social Media for Personal Learning

The measurement scale is: 1=Strongly Agree, 2=Agree, 3=Neutral, 4=Disagree, 5=Strongly Disagree. Spearman's rho rank calculation was carried out to test the difference in intrinsic motivation, supports, satisfaction and level of participation. The result indicates that most of the respondents perceived on intrinsic motivation of social media that MT5 (Using social media as part of teaching and learning statistics will make education process easier and more enjoyable) (mean = 2.19). Spearman's rank order correlation analysis shows that level of participation in social network and intrinsic motivation are significantly correlated in MT2 (interesting social medial learning) (r_s=-0.343, two-tailed p-level <0.01).

Using more time for participating in social network is thus correlated with receiving a stronger intrinsic motivation. The result also indicates that most of the respondents perceived on supports of social media that SP2 (Variety of resources available on social media (external links, sample exercises, practice assignments, videos, etc.) were helpful for my personal learning studies) (mean = 1.98). Spearman's rank order correlation analysis shows that level of participation in social network and social media supports are insignificantly correlated. Using more time for participating in social network is thus uncorrelated with having supports of social media. The result further indicates that most of the respondents perceived on satisfaction of social media that ST2 (Social media helped me to revise and learn at places and times convenient to me) (mean = 2.33, S.D. = .689). Spearman's rank order correlation analysis shows that level of participation in social network and social media satisfaction are insignificantly correlated. Using more time for participating in social network is thus uncorrelated with having satisfaction of social media.

4.4. Difference in Intrinsic Motivation, Supports, Satisfaction, and Level of Participation

Analysis of variance (ANOVA) was carried out to test the difference in intrinsic motivation, supports, satisfaction and level of participation. ANOVA shows that level of participation in social network and intrinsic motivation are significantly correlated in MT2 (interesting social medial learning) (F=4.674, Sig. F = 0.012). In summary, using more time for participating in social network was found correlated with receiving a stronger intrinsic motivation, and this is consistent with findings from literatures such as Wang et al. (2011). Nevertheless, it was found uncorrelated with having supports of social media, and uncorrelated with having satisfaction of social media, and thus inconsistent with past studies such as Gao, et al. (2010) and Yu, et al. (2010) respectively.

4.5. Difference in Intrinsic Motivation, Supports, Satisfaction, and Level of Participation

General comments were also gathered using open-ended questions. In short, the comments gave a positive attitude toward learning with social media but there were still a number of barriers as shown in the representative quotes. Respondents wrote that use of online platform for personal learning when students did not understand lesson, or needed to complete the assignment or homework, as it was easier, more convenient, flexible interesting, very useful, money saving with more choices and different ways (animation) to find extra information for self-learning.

However, some responded that its use was useless for those who were not interested as they preferred to study on the hardcopy note and textbook. They were not familiar with this online platform so they were not in habit to do so. They also worried that the sources might not be trusted. These respondents found no time and lazy to use it, as they used the time for fun (sports, play games). Other respondents commented that PLE social media is useful for personal learning statistics due to popular of social media, they perceived that it was easy and convenience to find, access, learn with step-by-step instructions, communicate and share information to learn statistics and carry out research. However, some respondents worry that Information was not filtered and they might get distracted. It was generally commented that PLE social media for

personal learning was efficient as it was flexible and accessible everywhere adoptable in high tech environment, so it was more convenient and effective for independent students.

5. CONCLUSION AND FUTURE DIRECTIONS

Learning through social network increases engagement and it has become the latest application of social media. It could be a matter of time that social media will be tomorrow's online learning platform. Findings from this study show that most learners are spending much time on accessing internet. However, its use for learning still needs further improvement. This could be caused by the lack of attractiveness of the online content for learning purposes. Therefore, instructors should consider use of the social media integrated in the LMS with interesting course content to facilitate learning. On the other hand, they are still some learners who tend to be very traditional in the type of media/formats they use. Learners may want to have a blended learning approach using online and offline formats. Hence, results from this pilot study have contributed to the development and design of the questionnaire for future full implementation.

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