EDUCATIONAL USE OF SOCIAL MEDIA: EXPLORING SCIENCE AND ENGINEERING COLLEGE STUDENTS' PERCEPTIONS ABOUT UTILIZING FACEBOOK TO ENHANCE THE LEARNING OF PHYSICS

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Dedication

I would like to dedicate this thesis project to my wife and children for their perseverance, support, and love throughout my educational journey.

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Abstract

The aim of this qualitative investigation is to explore a group of science and engineering students' perceptions about utilizing Facebook to enhance the learning of physics. Particularly, a survey composed of multiple choice and open-ended questions was employed as to obtain participants' reactions on a proposed scenario where Facebook is utilized in an Introductory Classical Mechanics course as the medium to manage the following academic activities throughout the semester: examinations, class preparations, study guides, homework assignments, lab preparations, creating group studies, and class participation dynamics. Out of the 120 potential candidates, 106 of them accepted to voluntarily participate in this investigation. After the analysis of the data concluded, it was found that, on average, 69% of the students reported to have a positive view about the hypothetical implementation of Facebook to mediate their learning in such an introductory physics class at the University of Texas at El Paso. The remaining 31% of participants simply expressed their lack of interest about this particular educational use of Facebook.

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Chapter 1: Background Information

1.1 Introduction

As shown by Lenhart (2010), 77% of teens reported that they contacted their friends daily via text messaging[1], and 33% did so via social network[2] systems. Moreover, statistics from Facebook[3], which as of June 2011 had over 500 million members, reported that over 50% of the users logged in a daily basis (Facebook, 2011). According to Facebook's own statistics, over 250 million individuals accessed Facebook through a mobile device[4]. Furthermore, Facebook interactions through such mobile devices doubled in relation to the non-mobile counterpart (Facebook, 2011, p. 1). In essence, due to the popularity and versatility of social media communication, particularly Facebook, among millennial generation of college students, it would be an asset to consider the integration of such a social network into higher educational institutions' academic curricula, as recommended by Arteaga Sánchez, Cortijo, & Javed (2014) in their discussion regarding the prediction of college students' adoption of Facebook being mainly attributed to Social Influence[5] and building or maintaining contact with other people with whom they share interests. The pedagogical potential of the inclusion of Facebook into such programs of study would be greatly maximized by exploiting the substantial ownership and accessibility of mobile devices, as shown by Scornavacca, Huff, & Marshall (2009) in their

[1] Refer to glossary for definition on text messaging.
[2] Refer to glossary for definition on social network.
[3] Refer to glossary for definition on Facebook.
[4] Refer to glossary for definition on mobile device.
[5] Refer to glossary for definition on Social Influence.

findings on the implementation of the Short-Message-Services (SMS)[6] tools on mobile phones to increase interactivity in particularly large college level courses.

1.2 Gap of the Study

After examining the review of the literature, it was noticed that the number of studies exploring the educational use of social media is insufficient. Moreover, the available investigations fail to examine the utilization of Facebook to enhance the learning of classical mechanistic concepts[7]. Furthermore, there was no existing literature concerning the study of the implementation of Facebook in relatively large introductory physics courses.

1.3 Purpose of the Study

Unsurprisingly, the features of technological innovations play a vital role in today's social interactions. Thus, the inspiration of the study was incited by the idea that the construction of learning must be aligned to students' present reality, as effusively proclaimed by Gruenewald (2003) in his intellectual analysis pertaining to how critical pedagogies[8] originated from creating awareness about one's position in time and space, not only geographically, but with respect to political, social, and economic individuals' realities.

Moreover, due to the collaboration factor intrinsically occurring during social media interactions, it is the aim of this investigation to examine a group of science and engineering college students' perceptions on their academic engagement being affected by the proposed scenario where Facebook is utilized to manage the academic curriculum of two Introductory

[6] Refer to glossary for definition on Short-Message-Service.
[7] Refer to glossary for definition on classical mechanics.
[8] Refer to glossary for definition on critical pedagogy.

Mechanics courses. In essence, since the process of learning is socially constructed, as stated by social constructivists learning theories[9], and communication through social media is characterized by abundant collaborative dynamical interactions, it is suspected that the learning of classical mechanistic principles would be substantially enriched by the employment of Facebook as the principal medium to operationalize the curriculum of such a physics course by facilitating the collective inter-communication during the execution of every academic activity taking place throughout the semester.

1.4 Researcher's Background

During the principal investigator's journey as a graduate student in the Physics Department at the University of Texas at El Paso, he was fortunate enough to work as a Teaching Assistant (TA) and Lab Instructor for ten semesters in the Introductory Mechanics and Astronomy courses. It was during the mentioned teaching experience that he began noticing the influence of technological innovations on the construction of learning about physics concepts. That is to say, the principal investigator for this thesis project was astonished as he observed students obtaining graphical information about resolving classical mechanistic concepts on their mobile devices. Thus, students enrolled in these introductory physics courses would manage to find webpages and mobile applications[10] such that by inputting a couple of words or a simple physics algorithm pertaining to a given physics problem, they would obtain a complete set of instructions, including pictures and derivations, on how to approach and manage to work the problem out. On the other hand, during his experience proctoring examinations, he observed students illicitly invoking the help of classmates or other individuals with physics expertise

[9] Refer to glossary for definition of social constructivism.
[10] Refer to glossary for definition of mobile applications.

through the features of social media communication. Moreover, author of this thesis project holds unpleasant memories about students not paying attention to his lectures because of their profound immersion in the realms of virtual socialization or game playing activities through their mobile devices. In essence, it was such an indisputable and popular presence of such technological instruments within the classroom settings that ignited the principal investigator's inquisitiveness about exploring the pedagogical impacts of systematically integrating social media into the Introductory Mechanics courses' academic curriculum.

1.5 Literature Review

After the exploration of the collaborative and interactive learning dynamism exemplified in the bodies of literature pertaining to the utilization of social media for academic purposes has concluded, the following themes emerged: Implementing social networks in formal academic curricula; limitations and caution regarding the adaptation of social media in academia; and the use of social media to facilitate the learning outside the classroom environment.

1.5.1 Implementing social networks in formal academic curricula. As investigated by Jacobsen & Forste (2011) in their exploration of the correlation between first-year college students and academic performance, it was found that the students' interaction with social networking and cell phones[11], in general, is directly associated with an increase in individuals' ability to engage into face-to-face- social interactions, which are indispensable features, according to social constructivist learning theories, required for an optimal functionality of the classroom participatory dynamism (p. 275).

[11] Refer to glossary for definition on cell phone.

In regards to the use of social media in university curricula, Donlan (2014) investigated students' perceptions pertaining to the implementation of Facebook in sport-related courses. After the analysis of the data obtained from a survey, it was found that out of the 112 participants (which majority of students' ages ranged from 18 to 21 at the time of the study), 95% of this sample reported that Facebook was their social network of choice. Moreover, there was no significant difference between female and male participants on the mentioned preference. Also, as described by Donlan (2014), 88% of the university students expressed to be interested or very interested in the utilization of Facebook in academic endeavors: specifically, 84% of them showed to be interested or very interested in interacting with their professors via the Facebook messenger; 86% reported their motivation for utilizing Facebook for the purpose of discussing the course content-related issues with other classmates; 90% reported their interest in accessing links, through their Facebook account, containing articles which supported the course material; and, 87% of them reported their motivation for receiving messages from professors, through the Facebook account, regarding updates about the course-related issues (p. 577). Continuing with the analysis of social media employed as learning tools within the classroom settings, Balakrishnan (2014) documented students' positive views regarding the potential pedagogical benefits of social media. Thus, it was discovered that the accessibility to social networks in academic settings, convenient use of social networks for collaborative purposes, and familiarity with such technological innovations were crucial factors in identifying the multiple academic advantages to the teaching and learning dynamics in post-secondary settings. It was further discovered that both faculty and students agreed on the benefits of social media when used as a didactical tool. Furthermore, after recording the students and lecturers' perceptions on the

applicability of social media, the results of the study revealed that integrating YouTube[12], Facebook, and Twitter[13] maximized the students' academic engagement and professors' feasibility to implement the academic curriculum (p. 602). Continuing with the evaluation of Facebook for academic purposes, Baran (2010), in his investigation with undergraduate students from the University of Dokuz Eylul at Turkey, reported that participants communicated their interest in utilizing Facebook as a tool to facilitate the teaching and learning duality. Specifically, it was stated that such a sample of students had a positive attitude toward the didactical implementation of Facebook as to enhance the student-teacher and student-student interactive collaboration and relationship in general. Furthermore, students in this study recommended the integration of Facebook in formal academic curricula. Similarly, Miron & Ravid (2015) reported the participants' positive attitudes about the implementation of Facebook as the medium to enhance the learning construction. Thus, the professors' fascination about the easiness of student-teacher communication through Facebook was particularly acknowledged. In taking advantage of the ever-increasing popularity of social media, Abe & Jordan (2013) recommend that the success of the integration of social media into the academic curricula depended on the students' critical and intentional use of it. The investigators further remarked the efficacy of Facebook in connecting with students and enhancing class participation. In general, the investigation suggested that social media could serve an excellent pedagogical agent for enhancing class collaboration and students' academic engagement.

Now, as it pertains to the integration of social media in high school level science courses, (Rap & Blonder, 2016) examined the utilization of Facebook as the principal medium to

[12] Refer to glossary for definition of YouTube.
[13] Refer to glossary for definition of Twitter.

construct learning about chemistry curriculum in 11th and 12th grades. Thus, it was observed that 47% of collaborative activities among students in the same chemistry class, through Facebook, revolved around homework assignments and course content material, and 22% of the posting on Facebook involved text and hyperlinks[14] about chemistry-learning. In essence, after the results of the data analysis were obtained, it was concluded that Facebook represents a potential academic tool for instructors in enhancing students' learning about chemistry principles (p. 62). Exploring the infusion of social media into university science curricula, Whittaker, Howarth, & Lymn (2014) reported the academic impacts of utilizing Facebook to create learning communities in an Animal Science class. Thus, the investigation's analysis revealed that, as a result of interacting through Facebook, the 42 participants in the study established more effective collaboration skills during the learning process, particularly on problem-solving strategies. As further mentioned by the investigators, the advantages of using Facebook to enhance the learning were notoriously maximized when a mobile device mediated the operationalization of such academic activities. Additionally, in studying college students' online-discussions in a Disease Management course, DiVall & Kirwin (2012) discovered that the 119 participants who interacted with faculty and classmates on class material content expressed their preference for using Facebook over Blackboard Course Management System[15]. Thus, this sample of students found Facebook to be helpful in enhancing their learning. Moreover, the mentioned participants enthusiastically recommended the didactical implementation Facebook in sequential courses. In essence, participants found Facebook to be very valuable and a substantial facilitator during their comprehension about disease management literature. Recognizing the massive participation of post-secondary health science students in social media, King, Greidanus, Carbonaro, Drummond,

[14] Refer to glossary for definition of hyperlink.
[15] Refer to glossary for definition of Blackboard Course Management System.

& Patterson (2009), after the analysis of the data, discovered the effectiveness of social networking environments in facilitating the creation of learning communities. Thus, researchers further emphasized the importance of such social media interaction in facilitating the learning through inter-professional group collaboration activities, and the accessibility to class material. As investigated by George, Dreibelbis, & Aumiller (2013) in their study with 154 students enrolled in a Health Science course, the students' participation during lectures was significantly improved by the incorporation of two social networks, Google Docs and SurveyMonkey. Thus, the analysis of the data further revealed that the utilization of social networks, as a medium to promote interactive learning during lectures, provided students with the opportunity of becoming co-creators in their own learning. As similarly revealed by Junco, Heiberger, & Loken (2011) in their investigation with 125 pre-health first-year college students, participants asked to use Twitter for academic purposes in their classes obtained higher grades and greater academic engagement than the students not utilizing Twitter for academic purposes (control group).

As in invoking the power of social media in online class curricula, Aubry (2013), in his investigation with 104 participants enrolled in an online French course for one semester in a major U.S. four-year higher educational institution, discovered that the students with access to the instructor's profile on Facebook (biographical information, photos, and other personal information) showed a significant positive shift in their academic motivation, as measured by a pre and post-test. In another college level course on linguistics, Po-chi & Craigie (2014) reported that, in their investigation with 164 students learning English as a second language at a Taiwanese university, there was a significant positive correlation between participants' English usage on Facebook and their academic achievement in such an English course (p. 21).