

A Study about Effects of Facebook on Conceptual Learning Mathematics

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Abstract—The purpose of this research is to find out how Facebook creates a positive effect when used in education; and to investigate students' satisfaction about their learning via Facebook compare to traditional education system. This experimental study was carried out with two groups of 10th level students and each one consisted of 20 members. One group was educated in real classroom (traditional education system) and the other one was educated by using Facebook (online learning environment). The study took 13 weeks and 52 hours. Data was collected using a 5-point Likert scale questionnaire created by the author and entitled "Students' opinions and satisfaction about their learning". It was completed by students at the beginning (pre-experience test) and the end of the study (post-experience test). Results show that, if Facebook is used for educational purposes, it could bring about a positive change in students' satisfaction. Results also indicate that Facebook virtual environment helps students to do many activities with online classes, which is not possible to be done in schools. This study shows that using Facebook environment helps students not only to improve their satisfaction about the course and what they learn during of it, but also it would improve their exam's grades. Based on the findings, recommendations are made about using Facebook in education.

Index Terms—Facebook, virtual learning environment, social networking, web 2.0 tools.

I. INTRODUCTION

It is not necessary to explain the statement that technology is ubiquitous, embracing almost every part of our lives, our communities, and every single hour of our life. On the other hand, the society and technology imbues each other, that they are in mutual dependence and that they cannot survive one without the other today at the beginning of the 21st century [1]-[3]. So in the field of education which is not an exception, technology doesn't have a secondary role in the sole process of knowledge transferring, especially because technology is becoming increasingly integrated into the lives of learners of all age groups [4]. Web 2.0 technologies, and specifically social networking sites such as Facebook and MySpace, have a very strong influence on the lives of millions of students [5]. The most popular social media website for students is Facebook which originally designed for college students in the United States (Harvard) in early 2004, Facebook was created as a social networking website which later expanded to different educational settings (not only institutions from the higher education sector) from other countries too, and then to the general public [6]. And research shows that

anywhere between 85% and 99% of students use Facebook [7]-[9]. On the other hand, each year, after ending the courses, there is a lot of students who passes their final exams by a great mark but they are not really satisfy about the courses and about what they really learned. This is a great challenge which helps us reaching a more effective educational environment. High usage of social media, especially Facebook, has made many educators wonder what role, if any, social networking could have in education [10].

Knowing all of this and having them in mind is the necessity of reaching a more effective educational environment. In this paper the use of Facebook will be examined, as a contemporary educational instrument. And the question, if Facebook can play an effective role in a high educational environment which brings more students' satisfaction about usability of their knowledge in the real life, will be answered.

A. Educational Points

Modes of Learning are first of all a framework that allows us to take apart a lot of conventional understandings of what learning is and how it works. One of the Modes of Learning Framework which presented by Harvard University (Professor Richard Elmore) [11] is to organize different points of view about learning into four quadrants. Each quadrant represents an extreme version of a particular point of view about learning. The Modes of Learning framework is organized around two axes. The horizontal axis is hierarchical to distribute and the vertical axis is individual to collective. Below in Fig. 1 some aspects of each mode are explained.



Fig. 1. The modes of learning.

1) Hierarchical individual

In Hierarchical Individual learning environment, learning

goals are as follow: Academic content is the most important thing that individuals learn; Academic learning can be measured and assessed.

Responsibilities for Learning are Individuals are responsible for success as learners; Authorities are accountable for measurable growth in individual learning.

How Learning Happens: Individual learning comes from the effort that individuals invest in their academic work; Teachers provide the academic work and knowledge that learners must acquire.

Social Structure is Youth require strong adult guidance in order to learn; Individuals who do well in school deserve social and economic success.

Defining Success is: Success is based on measurements of student learning; Standards and assessments represent society's agreement on what students should learn.

2) Hierarchical collective

Learning Goals are : The values expressed in an institution's goals and rules represent community values; Learners must acquire common values to become successful community members.

Responsibilities for Learning are: Learning comes from internalizing an institution's communal values and behaviors; Institutional leaders must create a positive social environment for this learning.

How Learning Happens: Learning comes from working respectfully and collaboratively with others; Adults guide learners, and help them master how to work well in groups.

Defining Success: Learners succeed when they participate productively and collaboratively in a community; The social and cognitive skills essential to success are not easily measured.

3) Distributed individual

Learning Goals are: Learners learn for their own benefits, to develop knowledge and skills as they want.

Responsibilities for Learning are: Individuals are responsible for what they learn, when they learn, and how they learn; Individuals choose what to learn based on their values, interests, and aptitudes.

How Learning Happens: Learning is an inherent biological imperative; people never stop learning; Learners must make sense of competing and diverse sources of knowledge

Social Structures are: Learning occurs through voluntary individual inquiry and social interaction; Sources for learning are broadly distributed throughout society, including but not limited to formal and informal educational institutions.

Defining Success: Success is determined by the individual learner, based on the learner's goals and ambitions.

4) Distributed collective

Learning Goals are: Learners learn what is of interest to them and to members of their learning network; By taking learning and teaching roles, individual create and maintain a strong community.

Responsibilities for Learning are: Communal learning is directed by shared values, interests, and preferences; Individuals choose to join or start a community based on personal and group learning goals.

How Learning Happens: Learning is an inherent biological

imperative; people never stop learning; Learners acquire knowledge and also teach what they know to others; Learners must make sense of competing and diverse sources of knowledge.

Social Structures are: Learning occurs through social interactions and engagement with others; Sources for learning are broadly distributed throughout society, and by learning and teaching others improve individual and communal abilities.

Defining Success: Success is determined by the learning community and its members; Individuals can access, learn from, and contribute meaningfully to various communities.

In this study I compare traditional learning with web-based learning which includes Hierarchical Learning mode (traditional schooling) and Distributed Collective mode (Facebook learning). It is clear that in each of learning modes, students' engagement is different. There is some researches show the effects of students' engagement on conceptual learning.

B. Students' Engagement

In 1984, Alexander Astin [12] proposed his developmental theory of college student involvement, which he later renamed "engagement." Astin (1984) defined engagement as "the amount of physical and psychological energy that the student devotes to the academic experience" (p. 297). His theory of student engagement was based on five tenets:

- 1) Engagement refers to the investment of physical and psychological energy;
- 2) Engagement occurs along a continuum (some students are more engaged than others and individual students are engaged in different activities at differing levels);
- 3) Engagement has both quantitative and qualitative features;
- 4) The amount of student learning and development associated with an educational program is directly related to the quality and quantity of student engagement in that program;
- 5) The effectiveness of any educational practice is directly related to the ability of that practice to increase student engagement.

C. Students' Engagement and Facebook

Jones et al. stated that social networking websites are tools that can be used by teachers and students to facilitate education [13]. It makes sense to examine the relationship between Facebook use and student engagement for two general reasons:

- 1) Today's students use Facebook at high rates, as illustrated by the statistics presented in the introduction and
- 2) Facebook intends to be an engaging platform going so far as to measure their success in terms of user engagement [14], [15].

Therefore, it is possible that students may be using Facebook in ways that influence or are influenced by real-world engagement. More specifically, student use and involvement on Facebook along Astin's (1984) five tenets of engagement can be conceptualized:

- 1) Engagement refers to the investment of physical and

psychological energy: Students invest a great deal of psychological energy in using Facebook, as evidenced by usage statistics;

- 2) Engagement to occur along a continuum: Some students are more engaged on Facebook than others, while some don't use social media at all;
- 3) Engagement has both quantitative and qualitative features: Students can spend a great deal of time using Facebook (quantitative feature) and may engage in a wide variety of activities on the platform (qualitative features);
- 4) The amount of student learning and development associated with an educational program is directly related to the quality and quantity of student engagement in that program: It is possible that Facebook use is related to real-world student engagement in some tangible ways.
- 5) The effectiveness of any educational practice is directly related to the ability of that practice to increase student engagement: If Facebook indeed increases engagement; it is possible for Facebook to be used in educationally relevant ways to improve student academic outcomes. [16]

Consequently, it can be said that, Facebook brings more students engagement as an environment.

D. Facebook and Education

Facebook creates a powerful education environment for teachers and students due to the powerful network structure it presents and its added online educational tool [17]. Users can also subscribe to the pages they are interested in. These pages are usually dedicated to celebrations, organizations, football teams, celebrities, etc. People who join these groups can easily find other people with shared interests and contact them to organize events. There are several ways of communicating via Facebook. For example, users can send each other private messages. Sending private messages is just like sending e-mails [18]. In fact, if students can create their own learning ways, they can access the applications and information, reach persons they are interested in and thus get comments from many people about the subjects they study. Teachers suggest students many applications where they can easily access the information they want, and they can approach all students at the same time [6]. Eventually Facebook is being considered as an educational tool because of its beneficial qualities such as enabling peer feedback, goodness of fit with social context, and interaction tools [19]. Hence, it can easily be deduced that it can be a useful educational tool, especially by providing active participation and collaboration [20]. All of these Facebook tools can prepare us an educational environment which is more close to forth quadrant of the mode of learning (Distributed collective learning).

Consequently, as it was mentioned, the challenge is where students reach the successes of Hierarchical individual education, but they are not satisfied about the usability of their knowledge. So I am going to move from Hierarchical individual quadrant to Distributed collective quadrant by using Facebook and comparing the results they have in an effective education and student's satisfaction.

II. PURPOSE OF THE STUDY

The purpose of this research is to find out the effects Facebook has on education if used for educational purposes and to investigate students' opinions and satisfaction about the formed learning environment.

In order to achieve these aims, the author has sought to answer the following questions:

Question 1: Did Facebook educational usage improved students' grades?

Question 2: Did Facebook educational environment change the students' satisfaction about what they really learned?

Question 3: Did Facebook as "Distributed collective" learning cover the successes of "Hierarchical individual" learning either?

III. METHODS

A. Setting

The course selected for this research is mathematics 2, which is obligatory course in the 10th level students. This experimental study was carried out by 40 students. The study took 13 weeks of a semester and 52 hours. One group of the students attended lessons and accessed materials on Facebook group of the course (Distributed collective education). They were able to co-operate and share information with their friends. And the other group of students accessed lessons in classroom by using a traditional educational system (Hierarchical individual education). In addition, at the beginning of the course, students were taken an exam to make sure that both groups are in same level of knowledge. So after the course, their final exam result could be compared as a useful scale which shows the effect of using Facebook in education.

B. Participants

The study sample consisted of 20 students from high school for hierarchical individual education and 20 students from high school with Facebook page for distributed collective education. These students were chosen randomly from a random high school. The age of the participants was 16, and both groups were just consisting of girls.

C. Instruments

To answer to the effects of Facebook environment on students' satisfaction (question 2 of the study) about what they really learn, a questionnaire was completed by students of Facebook group at the beginning and the end of the course. Data was collected from a questionnaire which created by the author entitled "Students' opinions and satisfaction about their learning". It consisted of 19 statements about students' satisfaction that had to be assessed using five-point Likert scale where 5 points were assigned to "strongly agree", 4 to "agree", 3 to "neutral", 2 to "disagree", 1 to "strongly disagree". Eventually, for realizing the effect of Facebook in learning, there is a comparison between pre and post-experience tests of Facebook course group. The validity of the questionnaire was reviewed by a panel of 10 educational experts and selected items were revised based on the experts' comments and recommendations.

TABLE I: PRE-EXPERIENCE AND POST-EXPERIENCE TEST RESULTS OF REGARDING SATISFACTIONS ABOUT THE USEFULNESS OF FACEBOOK IN EXPERIMENTAL GROUP (N=20)

| Statements | Facebook Group Pre-test | | Facebook Group Post-test | |
|---|-------------------------|------|--------------------------|------|
| | Mean | SD | Mean | SD |
| 1 -Traditional education gives me all I need to learn something. | 2.9 | 1.34 | 2.5 | 1.35 |
| 2 -All I expect from courses is getting a good mark in the final exam and pass it. | 3.1 | 1.46 | 2.95 | 1.43 |
| 3 -The results of exams don't give me any useful guidance to improve my understanding of the course material. | 3.7 | 1.08 | 3.15 | 1.42 |
| 4 -It is possible to pass this course (get a "C" or better) without understanding very well. | 3.35 | 1.15 | 3.25 | 1.16 |
| 5 -If I get an "A", it means I'm completely dominated on the course in the way I can use lessons in real life. | 2.35 | 1.37 | 3.1 | 1.16 |
| 6 -I'm going to study this course because I want to learn some useful lessons which they are going to help me in my daily life. | 4.2 | 1.05 | 4.35 | 0.93 |
| 7 -All I need to do to understand most of the basic ideas in this course is just read the text, work most of the problems, and/or pay close attention in class. | 2.8 | 1.28 | 2.5 | 0.85 |
| 8 -In traditional education system I share something related to the course which I found it interesting. | 2.15 | 0.93 | 2.05 | 0.88 |
| 9 -More engagement I have during the course, more understanding I will achieve. | 4.1 | 0.78 | 4.3 | 0.80 |
| 10 -Using technology makes the course more interesting, so I can concentrate more. | 3.45 | 1.09 | 3.85 | 1.18 |
| 11 -Using Facebook could bring an effective learning environment for learners and increase students' successes. | 2.5 | 1.23 | 3.65 | 1.13 |
| 12 -Facebook makes learning more enjoyable. | 2.9 | 1.25 | 3.4 | 1.39 |
| 13 -Having interaction with others on Facebook (via chat tools or comments or likes) is helpful in learning. | 3.3 | 1.45 | 3.55 | 1.27 |
| 14 -Facebook increases my motivation by allowing me to communicate with each other. | 3.8 | 1.2 | 3.95 | 1.09 |
| 15 -Using Facebook as an educational environment develops my team-work. | 3.05 | 1.43 | 3.35 | 1.49 |
| 16 -Using Facebook makes it convenient to access subject materials. | 3.75 | 0.96 | 4.15 | 0.98 |
| 17 -Seeing subject materials on Facebook helps us to become better | 3.2 | 1.10 | 3.45 | 1.19 |
| 18 -Facebook course distracts me and I will learn less compare to traditional education system. | 3.6 | 0.94 | 2.7 | 1.26 |
| 19 -In Facebook environment, I share learning materials more than classroom. | 3.6 | 1.39 | 3.95 | 1.14 |

D. Data Analysis

Each student of the Facebook course completed a pre- and

post-experience test in order to express their satisfaction about their ability to use their lessons in real life in addition to reaching a good result in their exams. Descriptive analysis was conducted and the results were compared.

To answer to the effect of using Facebook on students' results (question 1 of study), grades of both groups in final exam were compared.

IV. APPLICATION

A. Preparation of the Facebook Educational Environment

While Facebook virtual class environment was being designed, groups and Facebook pages were created. Facebook powerful Profile tools gave a chance to students to make friends with each other. The students also shared a lot of information with their classmates on profile pages. Thus, as mentioned, engagement to education has increased due to these sharing. Facebook Photo tools made lessons more interesting by giving the opportunity to create photo albums, share photos and make comments. Several learning materials have been added to the environment with the help of Facebook Wall tools. Thanks to this tool, news, videos, photos, notes, and questions suitable to lesson subjects were shared. With the help of Events tools, attendance of inside and outside classroom events could be planned and compared by the headers. Members were able to chat with each other online by using chat tools. In addition, environment was enriched with Web 2.0 tools. PowerPoint materials and documents were added to the environment through the adding and sharing function of the groups. Header of the course also was able to share students' homework in the group. In this way, students could contribute to others by sharing the documents they created or the ones they found helpful. Online lessons which consist of header's presentation were added by using youtube.com website's sharing features. Evaluation of student performance was made and forwarded to the students by the exact final exam of the other group but in shape of an online test. At the end of lessons, surveys were done by using Facebook's Questions tools and forwarded to the students. Getting back notifications improved lessons. In addition, students contributed by making comments about each other's materials using Facebook's 'Like' button and Comment tool. In this environment, header had shared photos, videos, questions, files, events and statuses related to the homework students were given, and students were able to share photos, videos, files and statuses they found it useful.

B. Results and Discussion

Table I presents the pre- and post-experience test means and standard deviation.

In Table I after the course, students in Facebook group stated that Facebook was an effective instrument for education, a supportive learning environment for lessons where they could share educational materials and have more engagement in learning process. In fact enables them to share information about scientific studies. It develops the team-working skills; could be helpful for both teachers and students when used as a supportive material in lessons; helps teachers and students to know each other better via the profile pages; could make learning more enjoyable; could increase students' motivation by allowing them to communicate with

each other; is not that much distractive they've thought before the course; and consequently could increase the students' successes and motivation for learning; In addition, as results show, because of better learning environment and more engagement, using Facebook increases students' satisfaction. So, they have more positive opinion about the relation between results of their exams and their useful knowledge which they achieve during the course.

TABLE II: STUDENTS FINAL EXAM'S GRADES.

| | Traditional education group | SD | Facebook education group | SD |
|--------|-----------------------------|------|--------------------------|------|
| grades | 16.46 | 1.28 | 17.32 | 1.23 |

In Table II it is clear that the exam's result of the Facebook group is higher than traditional education group which means that using Facebook not only increases students' satisfaction about what they learn but also it helps them to achieve a better result in their exams.

V. CONCLUSION

These results showed that the students' satisfaction of Facebook use for educational purposes was more positive by using Facebook course (as Distributed Collective educational system) compare to traditional education course (Hierarchical Individual educational system). The results present that Facebook Virtual Class enable several activities to be done by teachers and students which are not possible to do in "real-environment" classroom. For example the students' file and link sharing will increase their participation and motivation and in one word their engagement. Thanks to social networking websites, students and teachers can get to know each other better and take education to its highest level and more qualified by using of different tools. On the other hand, the final exam results suggest that this learning environment does not only help to improve students' satisfaction of their learning, but also helps them to achieve better results in exams. So our research has shown that Facebook as "Distributed collective" education system is a possible successful educational tool which covers the successes of "Hierarchical individual" education system either.

Based on our results, the author would encourage others to explore the use of Facebook as a supplement to traditional learning with more communities, reach to various teacher and student groups, and enriched with different web 2.0 tools (Android, IOS) and mobile technology applications. But also, beside of these positive points, the author should emphasize that such social networks are also prone to attack, and their vulnerability should not be overlooked [21], [22]. So the author would encourage others to survey these points and find some solutions through them.

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