EFFECTIVENSS OF FACEBOOK ON STUDENTS' ACHIEVMENT IN MATHEMATICS

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Abstract: *In the school practices used in Nepal the students studying math courses are supposed to show all steps used in solving a math problem. A random survey of answer papers submitted by students revealed that all students in a math class solved the questions in similar ways including the mistakes they made in solving them. The researchers assigned different types of questions as homework or assignments. After close observations, the researchers came to know that students were communicating via social networks like Facebook and share solutions. This observation led to this study? The researchers suggested students not to use Facebook and other social networks and focus on studies to address their parents' concern and worries. As a result of concerns by parents a short study was conducted using two groups. The participants were divided in two groups. The experimental group was allowed to use Facebook and the control group was taught in the traditional mode (Non Facebook based instructional method. The two groups were pretested immediately after teaching. The post-test results show that using interactive social media did improve students' performance on assignments and exams.*

Keywords: *Assignment, Facebook, Homework, Mathematics, Nepal*

1. INTRODUCTION

According to curriculum of Nepal, students are supposed to show steps while solving mathematical questions. We were very much surprised to get almost all students of class solved the questions in similar ways, the mistakes they made of similar types. This tendency has made us to think how is it possible? We assign different types of questions as homework or assignments but all students even below average level submit solutions on time. The students, who come to school, submit assignments with correct solution regularly on time, score very less marks on examination. It was quite difficult for researchers to find out this fact. After long studies, we came to know that students communicate via social networks like Facebook and share solution.

Social Networks are a popular means of communication especially amongst younger generations and students (Jones & Fox 2009). Social media like Facebook, Twitter, Messenger, Instagram, WhatsApp, etc. are quite popular in the world. Among social Networks, Facebook has become one of the most popular and prominent social network sites, having 1.65 billion monthly active users worldwide as of April 2016 (Facebook, 2016) which is a 15 percent increase year over year. Facebook users don't use it only to communicate with friends, to find old friends and to be in connecting with relatives only, Facebook has become a part of life for users. It is not confined within communication, entertainments, information but it has stood as teaching and learning tools as well. The social networks have brought radical changes in teaching and learning process even in Nepal in recent years. The social networking site Facebook has around 5-6 million monthly active users in Nepal (Facebook, 2016). This shows that Facebook users in Nepal have been increasing and become popular day by day. Social media activity, such as social networking, has become an integral part of students' lives (Cotten 2008). Many times the

researchers have heard from parents in formal and informal meeting "my kid is always hang on net and don't study at all". Parents come to school to get ideas how to control them from using Facebook and other social networks. Sometimes, they express their concern about inclination of their children to unwanted things like affair, unnecessary meetings with colleagues and wasting time rather than studies and so on. The researchers have suggested students not use Facebook and other social networks and focus on studies to address parents' concern and worries. There is time for you to use nets and so on in future when you finished your schooling.

We went through different research papers, journals, dissertation and books to study about effect of social networks, especially Facebook on studies and achievement of students.

Infam Khan (2103) has written on social sites that students are losing interest of studies, sports and anything around them. They hang on writing comments, updating their status chatting, sharing and so on. Facebook is good to connect with people from different regions, cultures and country, share ideas, knowledge and happiness. They don't interact with real people just because they are addicted to Facebook. They are losing the moral role of their life.

Richard Glass, Janet Prichard, Andrew Lafortune & Nicole Schwab (2013) conducted a research on "influence of Facebook use on student academic performance" have investigated that the amount of time that students spend on Facebook was found to be negatively related to academic performance. They further stated that the nature of the relationship may be far more complex than the simple assumption that students who spend more time on Facebook also spend less time studying and completing academic work. Time on Facebook may replace activities that are not of an academic nature but none the less may have an impact on academic performance such as face to face communications with peers or the number of hours that students sleep.

Different researches conducted in different countries showed different result according to context of their countries. In one hand, Parents complain and concerns about use of social networks have provoked us to conduct a comparative study about the effectiveness of Facebook on achievement of students on mathematics. In another hand, majority of students use Facebook and they are spending their important time on Facebook. The question aroused in our mind whether Facebook has negative or positive impacts on academic performance of students in Nepal. These two issues made us to conduct a research on this topic.

1.1 Purpose of the Study

The major purpose of this study is to compare and analyze the effectiveness of Facebook on achievement of students on mathematics at secondary level in Nepal between Facebook interaction instruction and non-Facebook interaction instruction. To acquire the purpose of the study, research question was-

1. What effects do Facebook interactional instruction and non-Facebook interactional instruction methods have on the academic achievement of students in mathematics?

2. METHODOLOGY

2.1 Participants and Procedures

Convenient purposeful sampling procedures were used. The study participants were all secondary students of class -9 of Meridian International School, Baluwatar, Kathmandu, Nepal. There were altogether 61 regular students of 36 boys and 25 girls. There were two Sections named A and B. The basic information of the participants is shown in Table 1.

Table 1: Total Population and Sample Size in Each District of Kathmandu.

Group	No. of boys	No. of girls	Total
Section-A Experimental	16	14	30
Section –B	20	10	30

Control

Section A was experimental group having 16 boys and 14 girls and Section –B as controlled group having 31 students with 20 boys and 10 girls. Students studied altogether 8 subjects (Nepali language; English; Mathematics; Science, Social Science; Health, Environment & Population; Additional Mathematics and Computer science). There was system of conducting one terminal examination in the gap of three months in Nepal and our school and three altogether in one year. Last year, there were only two terminal examinations due to earthquake.
The researcher has taught same curriculum, same text book to both Sections from May 2015 to September, 2015. The first terminal examination of 100 marks was conducted. After examination, Section-A was experimental group and Section –B was controlled group. After teaching from October to the beginning of March, another examination of 100 marks was conducted. The chapters, pattern of questions for both groups were same.
The researcher taught both groups 6 periods in week face-to-face classroom lecture and each period consists of 45 minutes. The teacher provided extra materials like questions bank, model questions and hands out for controlled group whereas the researchers had created closed group in Facebook for experimental group. The researchers provided mathematical problems from corresponding chapters and tips and hints to solve those problems if needed. The researchers uploaded useful teaching links, YouTube videos, other informative materials and resources via Facebook. All members were highly encouraged to try to solve problems. If some students solved problems, the remaining students of group had to go through solution, evaluate and give constructive feedback. They should give their constructive suggestion. The researchers had also given some local and famous international e-learning websites like, E-Pustakalaya; http://wapnepalonline.com; https: // www.khanacademy.org; ;http://www.softschools.com/math/worksheets; http://www.everythingmaths.co.za;
A pre-test-post test design was used in this study. The participants in both experimental (Facebook based instructional method) and the control (Non Facebook based instructional method) groups were pretested immediately after teaching three months from May to September. The first terminal was taken as Pres test whereas the final terminal was taken as post test. The same question paper was used to measure achievement grade of students of both groups. While setting questions, the objectives given in curriculum are strictly followed. The result of the first comparison will be used to measure the progress of the students in the experimental group.

3. ANALYSIS OF DATA

After teaching from beginning of May 2015 to mid of September, 2015, there was first terminal examination of 100 marks. The objectives of curriculum, cognitive domain, pattern and grids of questions given by Curriculum Development centre of Nepal were strictly followed while making questions. There were two types questions; short and long. There were 18 short questions which carried 36 marks whereas 16 long questions which carried 64 marks. So, a total mark was 100. Examination was conducted according to sit setting and time to given to both groups was 3 hours. The research checked answer sheets of students with marking schemes made by Head of Department. After checking all answer sheets, marks were inserted in excel and calculated mean, standard deviation and co-efficient of variance. The result of is presented in Table-2

Table 2: Pre-Test Results Between Two Groups

Students' Serial Number	Class-9A Experimental Pretest	Students' Serial Number	Class-9B Controlled Pretest
1	99	1	98

2	93	2	97
3	96	3	93
4	88	4	94
5	94	5	94
6	91	6	88
7	92	7	88
8	88	8	84
9	83	9	84
10	87	10	92
11	84	11	84
12	86	12	79
13	72	13	80
14	80	14	78
15	82	15	72
16	88	16	80
17	87	17	88
18	60	18	71
19	77	19	61
20	74	20	70
21	69	21	72
22	55	22	73
23	57	23	68
24	61	24	63
25	57	25	59
26	53	26	55
27	58	27	53
28	49	28	49
29	47	29	40
30	45	30	43
Mean	75.05		74.91
Maximum	99		98
Minimum	45		40
Standard deviation	16.67		16.24
Co-efficient of Variance	22.21%		21.67%

The Table 2 shows that the Mean of experimental group (75.05) with maximum (99), minimum (45) and standard deviation (16.67) is more than controlled group (74.91) with maximum (98), minimum (40) and standard deviation (16.24) by 0.14. The co-efficient of variance of experimental group (22.21%) is more than controlled group (21.67%) by 0.54%. It means there is more uniform in controlled group than experimental group. This result shows that there is no significant difference on students' achievement in mathematics between the two groups before the treatment.

3.1 Comparison of Post-test Results between Two Groups on Academic Achievement of Students in Mathematics

After teaching from beginning of October to the beginning of March, another examination of 100 marks was conducted. The same procedures were followed as first terminal examination. The chapters, pattern of questions for both groups were same. The result is presented in Table-3.

Table 3: Post-test Results between Two Groups

Students' Serial Number	Class-9A Experimental Posttest	Students' Serial Number	Class-9B Controlled Posttest
1	100	1	87
2	93	2	83
3	96	3	93
4	97	4	93
5	98	5	96
6	96	6	90
7	95	7	92
8	92	8	87
9	88	9	88
10	93	10	95
11	92	11	87
12	92	12	78
13	79	13	83
14	84	14	83
15	86	15	82
16	90	16	86
17	92	17	73
18	84	18	68
19	74	19	64
20	85	20	66
21	88	21	64
22	82	22	74
23	76	23	71
24	73	24	69
25	74	25	64
26	72	26	61
27	63	27	56
28	58	28	53
29	55	29	45
30	56	30	49
Mean	83.43		76.00
Maximum	100		96
Minimum	55		45
Standard deviation	12.88		14.52
Co-efficient of Variance	15.43%		19.10%

The Table 3 shows that the Mean of experimental group (83.43) with maximum (100), minimum (55) and standard deviation (12.88) is more than controlled group (76.00) with maximum (96), minimum (45) and standard deviation (14.52) by 7.43. The result showed the significant differences existed between the two groups regarding mean, maximum and minimum value. In pre-test there was no significant difference in their average marks but protest average marks of experimental group is more than controlled group by 7.43. It was great difference. The co-

efficient of variance of experimental group (15.43%) is less than controlled group (19.10%) by 3.67%. This shows that experimental group has more uniform than controlled group regarding achievement marks. This result shows that there is significant difference on students' achievement in mathematics between the two groups after the treatment.

3.2 Comparison of Pre-Test & Post-Test Results Of The Experimental Group on Academic Achievement of Students in Mathematics

Statistical values Mean, maximum, minimum, standard deviation and coefficient of variance of pre-test and post-test of experimental group was calculated to compare achievement marks in mathematics. The result is shown in Table 4.

Table 4: Pre-test & Post-test Results Of The Experimental Group

Students' Serial Number	Class-9A Experimental Pretest	Class-9A Experimental Posttest
1	99	100
2	93	93
3	96	96
4	88	97
5	94	98
6	91	96
7	92	95
8	88	92
9	83	88
10	87	93
11	84	92
12	86	92
13	72	79
14	80	84
15	82	86
16	88	90
17	87	92
18	60	84
19	77	74
20	74	85
21	69	88
22	55	82
23	57	76
24	61	73
25	57	74
26	53	72
27	58	63
28	49	58
29	47	55
30	45	56
Mean	75.05	83.43
Maximum	99	100
Minimum	45	55
Standard deviation	16.67	12.88
Co-efficient of	22.21%	15.43%

Variance

The Table 4 shows that the Mean of posttest of experimental group (83.43) with maximum (100), minimum (55) and standard deviation (12.88) is more than pretest (75.05) with maximum (99), minimum (45) and standard deviation (16.67) by 8.38. The result showed the significant differences existed regarding mean, maximum and minimum value. Average marks increased by 8.38. As shown above, after the experimental treatment, the experimental group presented significant growth in achievement marks in mathematics. The co-efficient of variance of experimental group (15.43%) is less than controlled group (22.21%) by 6.78%. This showed the result of posttest is more uniform than pretest.

3.3 Comparison of Pre-test & Post-test Results Of Controlled Group on Academic Achievement of Students in Mathematics

Statistical values Mean, maximum, minimum, standard deviation and co-efficient of variance of pretest and posttest of experimental group was calculated to compare achievement marks in mathematics. The result is shown in Table 5.

Table 5: Pre-test & Post-test Results Of The Experimental Group

Students' Serial Number	Class-9A Experimental Pretest	Class-9A Experimental Posttest
1	98	87
2	97	83
3	93	93
4	94	93
5	94	96
6	88	90
7	88	92
8	84	87
9	84	88
10	92	95
11	84	87
12	79	78
13	80	83
14	78	83
15	72	82
16	80	86
17	88	73
18	71	68
19	61	64
20	70	66
21	72	64
22	73	74
23	68	71
24	63	69
25	59	64
26	55	61
27	53	56
28	49	53
29	40	45

30	43	49
Mean	74.91	76.00
Maximum	98	96
Minimum	40	45
Standard deviation	16.24	14.52
Co-efficient of Variance	21.67%	19.10%

The Table 4 shows that the Mean of posttest of experimental group (76.00) with maximum (96100), minimum (45) and standard deviation (14.52) is more than pretest (74.91) with maximum (98), minimum (40) and standard deviation (16.24) by 1.09. The result showed no significant differences existed regarding mean, maximum and minimum value. The result also showed if teacher's instructional methods are similar and there is no significant difference in students' achievement marks in mathematics. The traditional teaching method without integrating technology and social networks like Facebook is unable to bring drastic changes in result in present era.

4. CONCLUSION AND DISCUSSION

In this study, the pretest-posttest experimental design was adopted. Students in the experimental group received interactive Facebook instructional methods while the controlled group received only traditional lecture method. According to result from research, students in the experimental group obtained significantly better marks than those in the controlled group in mathematics. Besides this, individual marks of the experimental group were significantly higher than those of the controlled group and mean grades of the experimental group were significantly higher than those of the control group. Consistent with the findings of other studies (Heiberger &Harper 2008) but in contrast with other findings (Astin 1984; Kirschner and Karpinski 2010), the amount of time spent on FB was found to be a positive predictor of grades. If students are left free to use social networks like Facebook, then students spent their time to write comments, tag photos, have live chat with friends. It kills their important time and it may not help for their studies. But if it can be used for instructional tool under monitor of responsible person, Facebook can be integrated into teaching and learning for better academic performances. This research shows that educators can consider the use of social networks, especially Facebook, an instructional instrument for teaching and learning. Facebook can be used as an educational communication and interaction tool to enhance teaching and learning.

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