

The effect of e- program based on Flipped learning on academic achievement for basic eighth grade students in Khartoum State and their attitudes towards it.

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Abstract:

This study was carried out to identify the effect of e- program based on Flipped Learning (FL) on academic achievement for basic eighth grade Students and their attitudes towards it. The researcher used quasi-experimental according to an e-program based on FL to teach the science course in our life at Khartoum State. A sample is selected numerating 36 students were divided into two equal groups: an experimental, that studied by using an e- program based on FL and control group that was studied by the traditional method. By using the appropriate statistical methods, the data was analyzed .The study concluded many results, the most important are: There are statistically significant differences at ($\alpha = 0.05$) between the mean scores of the experimental group that studied by using an e- program based on FL and the control group that was studied by the traditional method in post- test, in favor of the experimental group. There are positive attitude among basic eighth graders towards using the FL -based e-program. In light of the results, the study recommended conducting courses and workshops for the teachers and students in Sudanese basic education to train them on the concept and strategy of FL before its application, providing general education schools with technological tools, modern laboratory devices, and high speed internet, that to help teacher to prepare the needed materials according to the flipped classroom strategy.

Keywords: *Flipped Learning FL; Science course in our life; Academic achievement; Sudan.*

Introduction & Background

The current era is witnessing scientific and technical progress in various fields, resulting in an enlarged of knowledge and the emergence many obstacles in instructional learning practice, which justified the innovation of many future visualizations of the instructional learning process in light of contemporary global trends. And since it is of the most importance to keep pace with the instructional practice of these changes, it is necessary to join educational efforts to confront this explosion of knowledge and technical, and then find appropriate solutions to these obstacles. Effects of such changes are reflected on to what extent the educational systems are interested in reforming and using new strategies in international and learning processes. Consequently, many countries attempted to make structural modifications on teaching methods, to face the acceleration resulted from the huge changes in knowledge and informational fields. These challenges require a comprehensive review of the educational system in most countries of the world, including Sudan, which has led to the discovery of new approaches to develop and modernizing teaching processes.

As a newly emerging of teaching approach blending learning; Flipped Learning (FL) represents a means to such a better blend. FL combines asynchronous online lectures that individual students study outside of class with face to face classroom learning activities in

which students interact with peers and instructors. In this model of learning teachers shift direct learning out of the large group learning space and move it into the individual learning space, with the help of one of several techniques. Teachers record and narrate screen casts of work they do on their computer, create videos of themselves teaching. Or curate video lessons from internet sites. Thus students become agents of their own learning rather than the object of instruction, the FL can enable instructors to make the shift from teacher – driven instruction to student- centered learning. (Hamdan, et al., 2013).

The FL has been widely used in the last decade, largely in secondary and higher education contexts (Bentley; et.al, 2014; Flipped Learning Network, 2014). There is Opinions exist, published mainly in blogs, teachers' forums,, suggesting that the approach might work in other settings. Teachers all around the world are trying the approach in their classrooms and many report positive perceptions in the FL network (Peter; et.al, 2017).

Thus, through FL strategy, videos can be available for students to access whenever and wherever it is convenient as many times as they like, that enabling them to come to classroom better prepared Musallam, (2011); Oblinger, & Oblinger, (2005) indicated that capitalizing on the students' preparation, teachers can devote more time to opportunities for integrating and applying their knowledge, via a variety of student-centered, active learning strategies such as conducting research or working on projects with classmates.

According to Al-Kahili (2014); Bull, & Kjellstrom (2012). and Ali, (2015) there are many advantages to FL:

- Gives the teacher more time to help his students, and receive their inquiries.
- Building stronger relationships between the student and his teacher.
- Apply active learning with easily.
- Increasing the learning time, to combine between two periods and two places learning before and during the classroom.
- Creating an environment for collaborative learning in the classroom.
- Giving the student an ability to repeat the lesson more than once based on his individual differences.
- Giving more options to practice instruction according to technology applications such as video conferencing, social media and others.

As mentioned above, it is possible to say to what extend FL is effective on academic achievement by compiling the results of these studies. Therefore, it is needed to compile and synthesize the results of these studies which were conducted with different samples and in different environments and to reach common idea. Based on the above, this research comes to identify the effect of the e- program based on FL on academic achievement in the science in our life course for basic eighth grade students in Sudan.

By reviewing the previous literature, the researcher stood on many relevant studies that concerned with FL from many sides, and one of those studies is a study: Alzwekh, (2014) study aimed at studying the effect of flipped classroom concept in teaching the computer curriculum on self-learning skill in one of the schools in the eastern area in Saudi Arabia. The results showed growing and increasing skills of self-learning among female students in the experimental group. In addition, they showed that flipped classroom strategy contributed to take into account individual differences, learning according to their abilities, and encouraging bearing responsibility.

Chipp, (2013) have conducted another empirical study aimed at investigating the impact of using flipped Classroom in teaching mathematics at the New Jersey University in the United States. Where an experimental group of students has been taught mathematics course through using flipped classroom strategy, as the students received information at home through videos on the internet, and they were working in small groups at classroom to solve problems. Teaching of second group has used traditional teaching strategy. The classroom that used FL

strategy has achieved higher scores in tests than the other classroom where students have been taught by using traditional teaching strategy.

Dove, 2013 conducted a study to identify students' perceptions toward FL, the study was applied to a sample selected from community college for a one semester period in which the researcher recorded the lessons video and put it on YouTube before the lecture. The results indicated that students preferred this method over in-class lectures because it enabled them to work effectively through various activities rather than passively listening to the lecture in the classroom, which had believed it improved their conceptual understanding, also they spent the time in class in practicing and applying the material thus, they would prefer taking more flipped mathematics classes. De los Arcos, 2014 conducted study that aimed to identify the perceptions of the study sample from school teachers who applied FL through open educational resources to student achievement in some schools in the United States of America. The researcher concluded that the school teachers believes that employing open educational resources in FL has led to increased student satisfaction and engagement in their learning process. Also, they are doing some surveying and asking peers and they're trying to understand what would make this class better and justify that". Using open educational resources has changed the role in the classroom, as it has moved away from talking at students to a more collaborative approach. Keely, 2014 also conducted a study aimed at exploring the perceptions of eighth grade math students, their teachers, and their administrators regarding the use of video delivery to support engagement in a FL instructional model. Twenty participants were interviewed among five different focus groups. Fifteen eighth grade math students, three teachers, and two administrators were included in the interviews. Study concluded that student engagement was significantly higher when being taught from the FL instructional model. Implications for practice would suggest educators acquire a deeper understanding and implementation of FL. Lin Lai & Hwang, 2016 have conducted a study proposed a self-regulated flipped classroom approach to help students schedule their out-of-class time to effectively read and comprehend the learning content before class, such that they are capable of interacting with their peers and teachers in class for in-depth discussions. In order to evaluate the effectiveness of the proposed approach, a quasi-experimental design was employed in an elementary school Mathematics course. The experimental group students learned with the self-regulated flipped classroom approach, while the control group students learned with the conventional flipped classroom approach. The instruments used were a performance test, and questionnaires of self-efficacy and self-regulation. The experimental results indicated that the post-test score of the experimental group was significantly higher than that of the control group. It was also found that the higher self-regulation students showed significantly different learning achievements when learning with different approaches. Moreover, the experimental group showed significantly higher self-efficacy than the control group.

However, it is required that the time spent in classroom is utilized much more efficiently. It is indeed expected from today's students not only to know the basic information but also have the high-level skills. This is the reason why traditional teaching methods where students passively listen to their teachers have lost their meaning. Thus, FL has ability to meet these necessities of this century and it is clear that flipped classroom has great importance for today's instruction and teaching environments, from here it is important to study FL and identify its impact.

Research Objectives:

The Research aims to achieve the following Objectives:

- 1- Exploring the effect of e- program based on FL on academic achievement in the science in our life course for basic eighth grade students in Khartoum State?
- 2- Identifying the attitudes of basic eighth grade towards FL.

Research Questions:

So as to achieve of the objectives research, the following questions are formulated:

- 1- What is the effect of the e- program based on FL on academic achievement in the science in our life course for basic eighth grade students in Khartoum State?
- 2- What is the effect of the e- program on the attitudes of basic eighth grade students towards FL?

Research Hypothesis:

- 1- There are statistically significant differences at ($\alpha = 0.05$) between the mean scores of the experimental group that studied by using an e- program based on FL and the control group that was studied by the traditional method in post- test, in favor of the experimental group.
- 2- There are statistically significant differences in the mean scores of the experimental group for the scale of attitudes towards the - e-program based on FL.

Material and Methods:**a. Research Methodology:**

The research adopted quasi-experimental method, as it was applied to two research groups: experimental and control in order to compare the results of students in the post achievement test.

b. Population and Sample:

The research population consisted of eighth grade students in the basic education stage at the state of Khartoum. To conduct the current experiment, Abdoun Hammad School of Talent and Excellence was chosen in a deliberate way and the researcher freely chooses it on the basis that it achieves the purposes of the study; therefore, the eighth grade students of the school were chosen, numerating (36) students, as they divided into two equal groups: control and experimental groups. Before experimented, the researcher made sure to verify statistically from the equivalent of the research groups in some variables, which may affect in the results of the experiment, although the sample were from one school, and these variables included: the age, intelligence test and the level of achievement in the subject of science in our life in the mid-year exam for the previous year.

c. Instruments:

The researcher used the flipped class approach, according to an e-program based on FL to teach the science course in our life to the eighth grade students at Khartoum State, where the researcher transferred and sent the videos to each student in the class.

A post-test achievement was prepared consisting of four types of objective questions: multiple choice, true and false questions, short answers questions in addition to the correct completion questions, and a test specification table has been prepared. The conditions necessary for each type of test questions and instructions were taken into consideration, and then the test was rationed to ensure its validity and reliability. Ok

To identify the attitudes of the eighth grade students of the experimental sample towards FL, a attitude scale was prepared according to the Likert scale, to ensure its validity by presenting it to a group of arbitrators and experts experiencing and specializing in instructional technology and teaching methods, the observations and comments of the experts were considered and the scale was modified based on them. And then the reliability factor was calculated, which was high, which indicates the ability of the scale applicable Thus, the scale consisted of (23) items.

d. Research Design & Procedures:

- Experimental treatment materials were prepared and copied to CDs. On the other hand, the computers in the school lab are equipped with headphones, so that each student can integrate into the program individually.

- An introductory session was held with the research sample from the experimental group, to identify them how to deal with the e- program and the plan to go with it.
- The researcher chose the unit: “Microorganisms” from the book scheduled for science in our life course for basic eighth grade students in Khartoum State. In the light of the objectives of this unit and the number of lessons required for it, a guide for teaching the subjects that included in the unit selected for the experimental group was prepared according to the e- program based on FL, that the guide included teaching plans to use the flipped classroom strategy, according to the following stages:

a. Pre- planning stage: It represents the pre-classroom stage where the teacher prepares carefully planned text for what will be recorded in the video, that it maintains a link of information and its consistency clearly, away from the stuffing and crowding of information taking into language integrity and clarity of sound, then providing students the Video, either by CDs or uploading it to the Face book page to be distributed to students at least two days before the face-to-face class session, and here the teacher guides his students after watching the video to record their questions and inquiries about it so as to be discussed in the classroom.

b. Classroom planning stage: At this stage, a direct meeting was held between the teacher and his students in the classroom, where the teacher takes advantage of the whole class time by receiving students 'questions about the content of the lesson, that they viewed outside the classroom, then implementing instructional activities that would increase from the students 'experience, and guiding them towards applying what they have learned, and allowing them to communicate with each other.

After all the experimental design requirements for the research have been prepared, the researcher applied the experiment according to the following steps:

- 1- To verify the equalization of the study groups (control, experimental), a t-test was applied to students' scores in the two groups in the achievement pre-test. The result is shown in table 1

Table 1: The equalization of experimental and control groups in pre- test

Instrument	Group	Num,	Mean	SD.	df	t- value	Sig.	result
Pr-test	Experimental	18	25.22	3.36	34	0.21	0.583	No significant
	Control	18	25.00	3.30				

The table 1 indicates that the t- value was (0.21) which is not statistically significant at the level of significance ($\alpha = 0.05$). Bases on this result, there is not statistically significance between average scores of students of experimental and control groups in the Pr-test. That is an experimental and control groups are equivalent.

- 2- Introduce students to the strategy that will be followed in the experimental application in accordance with the e- program based on FL with the determation of the tasks that required from them.
- 3- Students from the sample were given videos of the lessons that have been downloaded, which are 8 lessons, thus the lessons together represent the microorganisms unit.
- 4- The students watched and listened the lessons from anywhere outside the classroom according to their circumstances and then recorded their observations and visions on the lesson in a paper and delivered it to the teacher at the beginning of the next classroom as a homework, with making sure all students are reading the lessons and preparing themselves for discussion and dialogue with the teacher.
- 5- On classroom day, students from the experimental sample were divided into homogeneous groups for dialogue and discussion on the topic of the specific lesson,

and made the discussion competitive for solving exercises, lessons, questions, and any other activities that had presented by the teacher.

- 6- The previous steps were repeated every week for eight weeks until the lessons were completed. As for the control group, was taught by the traditional method. (Speaking and explaining the lessons directly).
- 7- The post achievement test was conducted to both groups after one week of exposing the experimental group, followed by the distribution of the attitude scale to the experimental group, and then collecting the grades and analyzing the results by (SPSS) program using appropriate statistical methods..

Results and Discussion:

- **The first Question is**” What is the effect of the e- program based on FL on academic achievement in the science in our life course for basic eighth grade students in Khartoum State. To answer this question, means, standard deviations, and modified means of academic achievement scores are calculated according to the group variable (experimental, control) as shown in table 2

Table 2: The result of t- test for the mean grades of the two groups in the post-test

Instrument	Group	Num,	Mean	SD.	df	t- value	Sig.	result
post-test	Experimental	18	28.01	2.23	34	5.53	0.000	significant
	Control	18	23.97	6.21				

It is clear from the table 2 that the calculated value of “T” is greater than the value of “T” read, while the df is “34” and under a significance level (0.05) which is equal to (2.03); this indicates that there are statistically significant differences between the averages for the scores of the experimental and control groups in the post test in favour of the experimental group.

On the basis of this result, the first hypothesis is an acceptance, which states that: There are statistically significant differences at ($\alpha = 0.05$) between the mean scores of the experimental group that studied by using an e- program based on FL and the control group that was studied by the traditional method in post- test, in favor of the experimental group.

Which means that there are statistically significant differences between the mean scores of academic achievement for basic eighth grade students in the course of science in our life due to the e-program variable based on FL in favor of the experimental group.

With regard to the effect size from the application of the e. program based on FL in academic achievement, the researcher calculated the Eta squared (η^2) to measure the effect size of the e. program on students through the formula:

$$\eta^2 = \frac{t^2}{t^2 + df}$$

(Abu Allam, 2007)

The effect has reached (0.473), which is a significant impact size, according to Kiess, 2002, which indicates that e-program-based on FL has an effect on academic achievement for basic eighth grade students.

This result can be explained on the basis that FL enabled students to receive knowledge in effective methods and from various instructional sources, with the possibility of recording any notes they have. Hence, the best of the FL strategy may have affected on the

academic achievement of the experimental group students; it is the optimal investment of time by flipped the instructional situation by giving the student the content through instructional videos that they watch anywhere and anytime outside of classroom time, which The teacher is allowed to use the largest time of the class to accomplish instructional tasks and class activities which are often conducted through cooperative groups, where the students accomplish what is required of them.

Therefore, the teacher's impact through the FL strategy was evident in providing support to students with less achievement compared to their colleagues, that he helps them to gain concepts and understand them, and also increases the interaction between him and his students. On the other hand, watching videos at home may have contributed to make the teacher focuses during the classroom on who needs more time to learn and directing them to improve their performance.

Moreover, students' viewing the content in advance contributed from the researcher's point of view to raising many questions among students about the content that was seen, which may have led them to record their questions and observations and made them active during learning process in the classroom, while making sure to get answers about their questions, Thus, the students transformed from passive recipients to active students in their learning.

The researcher also attributes this result to the FL strategy that contributed to reaching conclusions and giving convincing explanations, which helped in developing students' awareness and more understanding of the lessons content, through:

- a. Developing students' innovative capabilities by asking their questions, which contributed to increasing the motivation towards learning and the impact learning remain.
- b. Moving from the external incentive to the internal incentive and be fully prepared to watch the videos anywhere and anytime.
- c. Developing student's curiosity and increasing their concentration while watching videos.

By the other hand, this result can be due to the steps taken outside the classroom and the listening of the student on the recorded videos and then his attendance to the classroom for class discussion with the teacher, which helps the student to acquire the necessary skills to collect data and information and so can be prepared to practice science operations that included in the objectives of the subject of science in our lives, which of observing, classifying, measuring, deducing and others, as well as the activities assigned to him, while giving the student freedom in time and space to carry out these tasks and activities and his departure from the routine of the classroom, all of what mentioned may have contributed to raise the level of academic achievement.

This study result agreed with Chipp, 2013 indicated that the classroom in which strategy of FL is used; achieve higher scores in tests than the classroom in which strategy of traditional method is used. And With the result of the Keely, 2014 study as well as the Lin Lai & Hwang study, 2016 whose experimental results indicated that the post-test score for the experimental group studied according to the FL strategy was significantly higher than the control group score studied in the usual way.

Hence, by using FL, enhancement is raised from the practical activity itself, from the excitement that the learner feels during presenting information and the practical application he does. Such activities present the content attractively leading to develop the scientific thinking in students through observation, understanding, , analyzing and assessment. So, these activities are close to the level of students and take into account the individual differences. Therefore, such differences appeared for the experimental group on academic achievement post-test.

The second Question is” What is the effect of the e- program on the attitudes of basic eighth grade students towards FL?

To answer this question, the researcher calculated the mean averages and the standard deviations of the responses of the sample individuals, as the attitude questionnaire adopted the five pinions according to Likert scale: I strongly agree (5), I agree (4), I do not know (3), I do not agree (2) I do not strongly agree with one degree; accordingly, the values of the mean reached by the study after statistical treatment were dealt with as follows:

Less than 2.33 negative attitude, from 2.33-2.66 neutral attitude, greater than 2.66 positive attitudes. The following table 3 shows the result of that:

Table 3: Respondents' responses to the questionnaires of the attitude towards FL

No.	Item	Mean	Sd.	Rank
1	FL increases the effectiveness of instruction centered on learning activities.	3.72	1.18	18
2	FL contributes to the exchange of ideas and information between one group members.	3.67	1.04	23
3	FL helps overcome the problem of individual differences.	3.76	0.79	15
4	I feel that FL is a waste of time and effort.	3.70	0.95	19
5	I think FL helped me to enhance knowledge and information.	3.67	0.98	22
6	I prefer flipped classroom method in the lecture than the traditional way.	4.04	0.88	4
7	I would like to use the flipped classroom in other courses.	3.80	1.22	12
8	FL helps me to get the best knowledge and skills.	3.78	0.97	13
9	FL increases my motivation to learn.	3.96	0.92	6
10	I had sufficient ability to learn and comprehend the course content during the FL.	3.88	0.84	11
11	I think learning with the traditional way is more interesting than FL.	3.70	0.95	20
12	The FL allow me has more time for play and extra-curricular activities.	3.68	1.16	21
13	FL gives students more opportunities to communicate with each other.	3.94	0.95	7
14	FL helped me to participate positively in discussions.	4.20	1.03	1
15	FL promotes critical thinking skills.	4.14	0.95	2
16	The lessons became more enjoyable by following the FL method.	4.10	1.01	3
17	I would not recommend the flipped classroom the rest of the students.	4.00	1.09	5
18	I think FL is investing class time effectively.	3.92	1.17	9

19	FL provides more opportunities for dialogue among students.	3.74	1.17	16
20	I see no benefit in using FL in teaching.	3.78	1.13	14
21	I liked overall, learning process through the flipped classroom.	3.74	1.28	17
22	. The environment of FL contributed to an active interactive classroom not available in traditional education.	3.92	1.12	8
23	I think receiving subjects of the science in our life course through FL has reduced my dependence on the teacher.	3.90	1.05	10
Overall average		3.90	1.17	

It is seen in table 3 that, the overall mean for the experimental sample responses to the attitude scale items was (3.90) with mean averages between (4.20 - 3.67) which are positive responses, as item 14 occupied "FL helped me to participate positively in discussions" The first rank with an average of (4.20) followed by items: 15 "FL promotes critical thinking skills.", 16 "The lessons became more enjoyable by following the FL method", 6 "I prefer flipped classroom method in the lecture than the traditional way", 17 "I would not recommend the flipped classroom the rest of the students "with averages: (4.14), (4.10),(4.04), (4.00), respectively. Which means that there are positive attitude among basic eighth graders towards using the FL -based e-program and thus the second hypothesis has been accepted, which states that: " There are statistically significant differences in the mean scores of the experimental group for the scale of attitudes towards the - e-program based on FL.

This result perhaps is attributed from the researcher's point of view to the constructive learning environment provided by FL thus, converting the usual lesson through available technology into registered lessons that are loaded on the Internet, where the teacher records a video of the lesson and publishes it to reach each student, so this represents the first step in the learning process, so the student to do the various activities and active learning before the classroom; then comes the class discussion phase for students with the teacher in the classroom, where there is time to raise their questions and inquiries; which may increase the motivation of learning among students and keep its impact on them; which led to a decrease in teacher-dependent learning and in return to an increase in student-centered learning itself. All of these factors combined contributed to students having positive attitudes towards FL.

This result is agreed with what was indicated by some studies, such as the study of De los Arcos, 2014 and the study of Dove, 2013, as it concluded that, the perceptions and attitudes of the sample towards FL as well as their satisfaction with the learning process and the positive participation that accompanied the FL strategy. This result is also compatible with the findings of the Abu Jalabah, 2016 study which summarized that there are positive attitudes towards Biology for the experimental group of first secondary school students that were studied using flipped classes by using the Edmodo website..

Conclusions & recommendations:

- Conclusion from this result, that teaching by using FL strategy increases the motivation to learn as being internal source of excitement, on contrary to the traditional method in which excitement is depending on teacher's, comments, questions, answers and forms of enhancement that student receives, thus the source of excitement is external.

- The FL Strategy according to Johnson, et.al, 2014, it has conducted fundamental changes in the instructional context as it enriches the instructional process and realizes positive instructional outcomes on the cognitive level represented in academic achievement.
- The use of FL in teaching eighth graders in basic education has undoubtedly changed the traditional teaching method; thus learning has transferred from teacher-dependent learning as a mentor to learning based on the student who seeks to employ technology to learn, and builds his knowledge and uses it in similar situations from during his practice of investigative activities and training assigned to him by the teacher, which had a positive impact in developing the level of academic achievement, while the traditional method relied on conservation; where the student does not acquire the concept from the activities but rather from the teacher directly.
- The result of this study and other previous studies as had indicated has shown that learners have positive attitudes towards FL in these classrooms. As FL allows learners to be active in the classroom through various tasks and activities.
- I think that, FL like other types of teaching and multiple learning environments, remains an option for the teacher whenever the conditions are appropriate for its success, and therefore the researcher believes that this type should not be promoted as the best or other types, because the learning environments differ in a way large and can't select one type to fit all of them. Let the principle of "multiple sources of learning and environments" prevail.

Based on the background of the study and its results, the researcher **recommends** the following:

- Conducting courses and workshops for the teachers and students in Sudanese basic education to train them on the concept and strategy of FL before its application.
- Providing general education schools in Sudan with technological tools, modern laboratory devices, and high speed internet, that to help teacher to prepare the needed materials according to the flipped classroom strategy.
- Urging basic school teachers to publish the content of the Subjects on specific sites on the Internet, and to support communication with their students in the light of the FL strategy through school web pages.
- Directing the curriculum developers at the Sudanese National Curriculum Center to include the curricula with subjects that are applicable according to the FL strategy that keeps pace with technological development.

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