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The Impact of The Flipped Classroom Strategy on Grade 11 Students of Nis, Chemistry and Biology, Shymkent.

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Abstract

This study examined the impact of using the flipped classroom strategy to teach "Laws of Motion" on the physics knowledge and attitudes of eleventh graders. Thirty eleventh grade Shymkent pupils were allocated to the experimental group, while the remaining 29 were assigned to the control group. A pre- and post-test of scientific knowledge as well as a physics attitude scale were administered. On both study variables, the results indicated that there were statistically significant differences in favour of the experimental group between the study groups. The study suggested employing a flexible instructional approach when teaching scientific concepts.

Keywords: flipped classroom strategy, understanding of physics concepts, attitudes towards physics.

Introduction and Literature Review:

It goes without saying that the introduction of new technologies has influenced every aspect of contemporary society; education is not an exception. (Jensen, J.; Kummer, T. & Godoy, P., 2015) It is becoming more common for new technology to be included into almost all educational

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advances to improve classroom learning. Considering this, a significant number of educators are actively searching for the most effective approach to imparting scientific knowledge. According to Orlich (2013), the educational practises that are now prevalent in contemporary school's demand instructors to develop adaptable methods of instruction to satisfy the requirements of their diverse student populations. The Flipped Classroom (FC) approach is one of the creative methods of teaching that is adaptable enough to be used for a variety of pedagogical contexts. "The mixed combination of traditional learning with web-based online approaches" is how Trigwell (2005) describes "flipped classroom." In addition to this, flipped classrooms, also known as FC, are recognised as an educational transition. This shift is shown as an opportunity to let students to offer direction to their learning process, building on their skills and interests and making use of the face-to-face instructional time (Bergmann & Sams, 2014).In their definition of flipping the classroom, Lage, Platt, and Treglia (2000) said, "Inverting the classroom means that events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa. "Whereas Bishop and Verleger pointed out in 2013 that the FC only symbolises a re-ordering of "in-class" and "out-of-classroom" activities, the FC is just a re-organization. Because of this, Bishop and Verleger characterised the FC as "...an educational approach that consists of two parts: interactive group learning activities inside the classroom, and direct computer-based individual instruction outside the classroom" [2]. According to Hattie (2008) and Schwerdt and Wupperman (2010), the use of FC may be an efficient way to assist students in acquiring new knowledge. The FC emphasises cooperation with the student-centered approach and active learning (Salmon, 2000). Additionally, the FC makes classroom time available for constructivist methods of instruction. According to Thornbury and others (2006), constructivism is a philosophy of learning that places students at the centre of the learning process and encourages them to actively "construct" their own knowledge rather than just receiving information. In addition to this, the focus of FC is to increase the levels of student involvement as well as student performance (Fulton, 2012). The FC had been described by several academics owing to the fact that it fosters the role of collaboration and provides students with the chance to develop their own theories without needing any modification to the educational notion. In addition, the FC had been characterised because it had been characterised by a number of academics. Because this form of engagement has the most substantial influence of any instructional activity, increasing the amount of time that is allocated for delivering feedback might considerably boost student learning (Beesley & Apthorp, 2010;

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Hattie, 2008). Researchers have approached the study of FC from a diverse range of perspectives. Nouri (2016) surveyed 240 undergraduate students at Stockholm University in Sweden to discover their thoughts on the FC method of teaching and learning. The research was published in the journal Education and Urban Society. According to the findings of the study, most students had a positive attitude towards learning information via FC. Rae (2017) conducted a study with the intention of determining not just the relationship that exists between the students' perspectives on FC and their ability for self-regulated learning, but also the effect that these aspects have on the students' overall academic performance. This study was published in the journal Educational Researcher. This study was carried out with the assistance of seventy-six students who were enrolled in a biology class that was basic level. According to the results, the perspectives that students have on the flipped model serve as a reliable indicator of the variety of self-regulated learning strategies that they put into practise throughout their academic careers. In addition, the data show that FC showcase the accomplishment of students in the active learning sessions by employing constructivist teaching methodologies. This was done by using the flipped classroom model. The purpose of the study that was carried out by Eyitayo (2017) was to investigate the effect that using a flipped teaching strategy had on the academic performance and attitudes of 66 first-year students in secondary school towards the topic of chemistry. According to the results, the students who took part in the flipped classroom were able to gain a deeper conceptual understanding of scientific themes than their peers who were in the control condition. This was the case because they were exposed to the material in a different format. On each review, favourable and significant improvements were seen, with the students in the flipped class doing much better on average. According to the outcomes of a research that was carried out by Attaran and Zainuddin (2015), most students had positive opinions towards the implementation of FC, and most students would recommend flipped learning to other persons. classrooms as well as the other students. those who had problems communicating as well as those who were easily worried benefitted from being in an inverted classroom. The outcomes of a study that was conducted by Jin Su, Darvid, and Florentina (2016) indicated that the students had positive attitudes towards flipped classrooms. Most of the pupils expressed the view that they would welcome the opportunity to participate more actively in other courses if the instructors took the opposite approach to teaching them as they did in FC. They believed that it was an educationally beneficial experience. Marlowe (2012) conducted research to see how the students' overall performance as well as their stress levels were affected

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by the flexible classroom environment. The investigation was carried out with the involvement of 19 students from Dubai who were in the second year of the International Baccalaureate Standard Level Environmental Systems and Societies (ESS) course. These students were enrolled in the programme. Even though there were no visible differences in the students' levels of academic performance, the outcomes of the study indicated that students who attended courses in open layouts reported much lower levels of stress. This was the case even though there were no differences in the classroom layouts. Zheng, Becker, and Ding (2014) from the University of Wisconsin-Stout compared the conventional method of instructing to an approach known as flipping the courses as an alternative to the conventional method of educating. Participating in this experiment were twenty-five students who were enrolled in a class named "Fundamentals of Plastics Materials and Processing." According to the results, teaching utilising the FC approach resulted in time savings and provided for a more effective use of the available class time. This was shown by the fact that the time saved could then be used for other purposes. Baki Mohammed Diab and Khaled Mohammed Abdel (2016) conducted research on the impact of the FC on students' performance on the new SAT 2016 mathematical ability test for students in the 11th grade attending Al-Ain Emirate. The College Board oversaw directing the examination. According to the results, the overall performance of the students had greatly improved, which was particularly notable when compared to the performance of their contemporaries. According to the findings of the study, there are a great many advantages to using FC in a wide variety of contexts. Among these advantages are the enhancement of students' academic accomplishment, the facilitation of students' improved time management in class, and the reduction of students' levels of stress. This investigation's overarching objective is to ascertain whether the United Arab Emirates (UAE) are in a position to take advantage of any of the possible advantages associated with the use of FC.

The significance of the findings of the research

New research uses a quantitative approach to explore whether flipping the traditional classroom education model influences the level of accomplishment pupils attain in physics. The significance of this research is in determining how to incentivize physics instructors to make use of a diverse array of instructional strategies and how to put those strategies into practise in a way that inspires students while also catering to their specific needs.

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A description of the issue being investigated.

This research investigates the impact that using flipped classroom instruction, as opposed to the conventional approach, has on students' academic performance as well as their views towards pursuing further education in the subject of physics. The participants are eleventh-grade students. In particular, the purpose of this study is to find answers to the following two questions:

Does using the FC teaching style result in significantly different levels of grasp of physics subjects within the student body as a whole?

Does the use of the FC teaching technique result in significantly different perspectives held by students regarding the subject of physics?

Methodology

Individuals that took part in the research

The current research investigates the effect that using the FC technique has on the academic accomplishment of students in the eleventh grade as well as their attitudes towards the process of studying physics. There were 59 students in the 11th grade who were chosen at random to take part in the research and given the responsibility of being a participant. The participants were separated into two groups: the experimental group (consisting of 30 people) and the control group (consisting of 29 people). The same physics teacher was responsible for both of these different courses.

Methods of Academic Research

The scientific ideas exam and the attitudes towards physics scale were the two tools that were used in this investigation.

Scientific concepts test

Students in the eleventh grade were given the exam (laws of motion) to determine their understanding of scientific ideas so that the investigation's questions could be answered. This examination was constructed in accordance with a particular study of unit nine, which discusses laws of motion. The examination consisted of 25 questions that were objective in nature, and each of the multiple-choice questions had only one correct response.

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To retain the validity of the exam, it has been rechecked by three instructors who work at various schools, and they proposed lowering the amount of the questions to be 16 instead of 25. The questions that were asked were all objective, and the answers provided by the instructor were right. The reliability of the test was evaluated with the use of Cronbach's Alpha Equation. And the answer turned out to be 0.83, which is acceptable for the purpose of the scientific enquiry.

The attitudes of students towards physics are measured. Accordingly, the researcher employed a survey to examine the attitudes of students towards physics as the relevant literature suggested (Gamze, Mhmet& Kamielm2011). The poll included a total of thirty questions, which were broken down as follows: the emotional side received 17 points, while the behavioural side received 13 points. On a scale from 1 to 5, with 1 representing highly not applied, 2 representing not applied, 3 representing applied, and 4 representing strongly applied, respondents indicate their responses. The scale was verified by a council of specialised educators, and in addition, it underwent pilot testing with a group of thirty children.

Data collection

The present study uses the quasi-experimental method. The researcher used a quantitative method to collect the study's data. He or she made a test of science knowledge and a poll to find out how the students felt about learning Physics. Before and after the experiment, the researcher gave both the test and the poll. Then, the treatment ran three weeks and had 15 lessons. The researcher made the planned unit for grade eleven. Instructional videos and online lessons were sent to students on WhatsApp the day before the lesson at school. Students were then asked to watch them and talk about them with their teacher the next day in class. After the experiment, the researcher used the two tools again and compared the results of the scientific test of the ideas and the survey with the results of the students. The study's questions were answered by using the Analysis of Variance.

The results and what they mean

To answer the first question of the study, "Are there significant differences in how well students understand scientific concepts when the flipped classroom teaching strategy is used?" the mean scores (M) and standard deviations (SD) of tests on scientific concepts were calculated (see Table 1).

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Table 1 shows the mean results and standard deviation for science tests.

		Pre-Test	Post Test
Experimental	N	30	30
	M	5.667	12.9333
	SD	1.98847	2.55874
Control	N	29	29
	M	4.7931	7.4828
	SD	1.56706	2.16499

As can be seen in Table (1), there are apparent differences in the means between the experimental group and the control group in the results of scientific concepts test. To stand on the significance of these differences, ANOVA test was used (see Table 2).

Table 2: Tests of Between-Subjects effects for students' results in scientific concepts test

Source	Type III Sum of squares	Df	Mean Square	F	Sig.
Corrected Model	461,992	2	230,996	43,526	,000
Intercept	416,793	1	416,793	78,536	,000
Pre-test (concepts)	23,914	1	23,914	4,506	,038
Group	366,367	1	366,367	69,034*	,000
Error	297,194	56	5,307		
Total	6963,000	59			

*Statistically significant difference (α=0.05) As can be seen in Table (2), the differences in the mean scores of students' results in scientific concepts test are statistically significant (F= 69.034). Referring to Table (1), differences are in favour of students who learned the target concepts using flipped classroom strategy. To answer the second question (i.e. Are there significant differences in students' attitudes towards physics related to using flipped classroom teaching strategy?) the mean scores and standard deviations of students results in Attitude towards physics scale were calculated (see Table 3)

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Table 3: Mean scores and standard deviations of students' results in Attitudes towards physics scale

Group		Pre- test	Post-test
Experimental	N	30	30
	M	95.7000	111.3000
	SD	17.77474	21.04535
Control	N	29	29
	M	88.6552	96.1034
	SD	23.98999	21.52796

As can be seen in Table (3), there are apparent differences in the means between the experimental group and the control group in the results of attitudes towards physics scale. To stand on the significance of these differences, ANOVA test was used (see Table 4).

Table 4: Tests of Between-Subjects effects for students' results in Attitudes towards physics scale

Source	Type III Sum of squares	Df	Mean Square	F	Sig.
Corrected Model	13731,275	2	6865,638	24,813	,000
Intercept	5680,581	1	5680,581	20,530	,000
Pre-test (Attitudes)	10325,960	1	10325,960	37,319	,000
Group	1638,851	1	1638,851	5,923*	,018
Error	15495,030	56	276,697		
Total	665292,000	59			

Table 4 shows that there are statistically significant differences (F=5,923) between how students scored on the scale of how they felt about physics. If you look at Table 3, you can see that the changes are in favour of the students who used the flipped classroom approach to learn the key ideas.

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The results of this study showed that students who were taught using the "flipped classroom" method had a better understanding of science and a more positive view of physics. Other studies (like Eyitayo's from 2017, Marlowe's from 2012, and Baki Mohammed Diab and Khaled Mohammed Abdel's from 2016) have also found the same thing.

The split classroom approach, which changed the way people learn, is responsible for these findings. First of all, the flipped classroom has changed how students think about learning and teaching. In the flipped classroom, each student has his or her own study time, which helps him or her learn better. (Salmon, 2000; Thornbury, 2006) The split classroom also supports active learning, in which each student builds his or her own knowledge. In a split classroom, the student can learn at the time and place that works best for him or her.

Overall, the results of this study showed that changing the classroom can help students learn a lot and feel better about learning physics.

6. Recommendations

Based on the results of this study, it could be suggested that: - The flipped classroom method of teaching physics in high schools is a good way to do it.

- Work on using the flipped classroom method to teach different topics and do study on those areas.

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