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Flipped Classroom Effects on Grade 9 Students' Critical Thinking Skills, Psychological Stress, and Academic Achievement

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Flipped classroom is a recent trend in educational technology that tends to improve students learning. The purpose of this study is to examine the effectiveness of flipped classroom on grade 9 students' critical thinking skills, psychological stress and academic achievement in four subjects: Science, Math, IT and English. Quasi-experimental method was used in this study with pretest–posttest design for quantitative data, and the thematic analysis approach for qualitative data. The respondents are 16 teachers and 385 students from 4 public male and female schools. The study was conducted during the second semester 2019. The video lessons that developed or selected from internet were presented on closed Facebook group per subject for students to view and prepare before coming to classroom session. Seven research tools were prepared: open questionnaire tool for teachers and six research tools for students were prepared and conducted twice for experimental and control groups: before and after flipped classroom implementation. The tools were critical thinking skills test, psychological stress questionnaire and academic achievement test per subject. Descriptive and inferential analyses were used. The flipped classroom implementation results in statistically significant difference at the level of significance ($\alpha < 0.05$) between controlled and experimental groups in favor of the latter one in critical thinking skills, Math achievement and psychological stress.

Keywords: flipped classroom, flipped learning, academic achievement, critical thinking and psychological stress

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INTRODUCTION

Flipped classroom (FC) or flipped learning is a new trend used last decade in Information and Communication Technology (ICT) that can improve Students' Learning Process (SLP). FC is one of the blended learning methods (Al Mulhim, 2021) that can be used in this Covid19 pandemic situation. It is a new technology-enabled pedagogy of using different resources and Learning Management Systems (LMS) for presentation and communication between schools and students. FC is an inversion of traditional methods in order to have more students' engagement in SLP (Ayçiçek & Yanpar Yelken, 2018; Boubih et al., 2020; Tucker, 2012). Bergmann and Sams (2012) who are considered as the pioneers of FC defined it as a process whereby: "that which is traditionally done in class is now done at home, and which is traditionally done as homework is now completed in class". Students review Video Lessons (VLs) and other required materials before coming to the classroom session and then at classroom, they do activities, exchange knowledge, and solve homework with the help of their peers and teacher (Abuhmaid & Abood, 2020; Girmen & Kaya, 2019; Hamdan et al., 2013; Karlsson & Janson, 2016; Sutama et al., 2020).

FC is suitable for the digital students in the 21st century who prefer using digital and social media in their learning (Yildirim & Kiray, 2016). FC helps students to make connections between their home learning (viewing VLs) and classroom learning (applications and activities); they bridge home and school as social worlds which increase their learning potential (Threlkeld, 2017). In this regards, FC can increase and maximize interaction time inside classroom between students and teacher by flipping teachers' role from "Sage on the Stage" to "Guide on the Side" (Atwa & Sulyeh, 2020; Ayçiçek & Yanpar Yelken, 2018; Panopto, 2016).

Constructivist theory introduces the FC framework, since it is based on how learners acquire knowledge (Clark, 2013). Students prepare lessons by viewing VLs at home; they can build and relate new information to what they already have by making meaning of the learning. In addition to that, students can improve their understanding in the classroom with help of the teachers and their peers (Ayçiçek & Yanpar Yelken, 2018). The FC supports the active learning and the student-centered approach, which in turn enables students to acquire knowledge through the application of the constructive theory. This improves the SLP which may improve the students' achievements, critical thinking skills and reduces psychological stress. Moreover, ICT integration in the developed VLs will personalize learning by enhancing student-centered approach by motivating high schools students towards active learning and excellent academic achievements (Atwa et al., 2016).

Research problem

There is paucity in using educational technology in the Palestinian schools. About 78% of secondary school do not utilize any type of teaching tools, and only 9% use digital tools (MOEHE, 2016). Moreover, the Palestinian Ministry of Education and Higher Education (MOEHE) is raising digitization slogan since many years, and FC support

this slogan. Students' Academic Achievement (AA) is important in the Palestinian culture.

Critical Thinking Skills (CTS) is one of the Palestinian curriculum aims and one of the 21st century skills. CTS is considered to be one of the basics of 21st century learning that improves motivation and learning outcomes (Trilling & Fadel, 2012). It is one of the 21st century dimension skills which consists of Critical Thinking, Communication, Creativity, and Collaboration (Siahaan et al., 2020).They are known as 4Cs. CTS is very low for the Palestinian students and less than the global proficiency level (MOEHE, 2016). Khaldi and kishek (2020) developed a rubric that consisted of twelve main themes of the 21st Century skills to investigate the extent of their availability in the Palestinian Science and Math curricula. The content analysis findings indicated that the existing availability themes in the curricula represent the skills for the 21st century poorly with low focus and insufficient attention on most skills that had been analyzed. The CTS availability got the highest grade in science and math of grade 8: they are 17.6% and 9.3% respectively (Khaldi & kishek, 2020). Implementing FC in school environment, may improve the students CTS.

Grade 9 students are teenagers (14-15 years old), and they are experiencing the adolescent stage which is accompanied by psychological and physical changes. Moreover, the Palestinian changing circumstances may cause Psychological Stress (PS) on students due to the curfews and checkpoints between cities and villages that imposed by the Israeli occupation for Palestine. Stress is the pressure that individual faces from the environment strain that considered as an interaction between a situation and individual. Stress presents itself when the internal and external pressures exceed the individual's resources to cope with the situation that negatively affects the individual's psychology (Adom et al., 2020). In this regards, FC may reduce students PS.

Israeli occupation deprives students' safe access to schools, other violent practices (detention, injury) impact their cognitive and physical health. Such obstacles posed by the Israeli occupation negatively affect students' educational achievement (MOEHE, 2017). This, in turn, negatively affects the students PS and AA.

In the academic year 2016/2017, "The percentage of students enrolled in the literary stream is (76%), compared with (21%) in the scientific stream and (3%) in IT and vocational stream" (MOEHE, 2017, p.:86). Students of grade 9 began to determine their future stream by choosing either literature, scientific, IT or vocational stream. Science and Math subjects are important for the scientific stream, information technology for IT stream and English for all. Moreover, learning science, Math and English courses may be considered difficult for some students and this causes low AA and more PS. In general, Palestinian situations are unstable and changing due to the curfews and checkpoints between cities and villages that imposed by the Israeli occupation forces for Palestine. Implementing FC in SLP can make it fun process, attractive and may be less PS for students and teachers. This may encourage more students to select scientific and IT streams; and their PS decreases.

In addition to that, the researcher did not find studies that have explored FC implementation in teaching the four subjects together for Palestinian grade 9 students. Also, there is a need for conducting more research on the effectiveness of FC on SLP aspects (Atwa & Sulyeh, 2020; Girmen & Kaya, 2019; Chao et al., 2015; Hamdan et al., 2013; Zainuddin & Halili, 2016). The results from this study shall contribute to the body of knowledge and minimize the gap in literature.

Research Significance

The significance of this research lies in its contribution in improving the SLP to address the importance of FC. This research including the developed video lessons -that teachers developed according to their subjects or selected from internet with some modifications -, is significant for the following reasons:

1. It contributes to FC research and adds knowledge to digitization in line with the MOEHE digitization initiatives.
2. It provides insights decision makers and curriculum designers to improve textbooks by utilizing ICT applications and training teachers.
3. The developed VLs will be useful and valuable for other teachers in the future. Teachers in the same school are encouraged to implement FC.

METHOD

Aim and Objectives

The aim of this research is to investigate the effects of FC implementation in Science, Mathematics, IT and English teaching on Palestinian 9th grade students' AA, CTS and PS in West Bank (WB) and Gaza Strips (GS). The main objectives are:

1. To investigate the effects of implementing FC in teaching each of the four courses (science, Math, IT and English) on Palestinian grade 9 students' AA, CTS and PS.
2. To examine teachers' perceptions about advantages and challenges for implementing FC.

Research Design

The quantitative design method is suitable for this research that it is common in educational research to collect, analyze, and interpret the required data (Creswell, 2012). The pretest – posttest design (PPD) is used to experiment the effect of the FC on grade 9 students' AA, CTS and PS. This is the suitable design for this quasi-experimental study. The PPD is a common way of determining change caused by the treatment group. The descriptive statistics method (mean, standard deviation) is used for describing score results and students' tests. Moreover, inferential statistics, involving independent samples t-test was used to determine the significant differences between the groups.

Study Groups

To have comprehensive data, gender groups (male/ female) and location in (WB/ GS) are included in each category of experimental and control groups. To achieve the study objectives, the study sample has been chosen purposefully due to the following criteria:

1. Each school has at least two classes (sections) of 9th grade of around 25 students in each class, one for experimental FC group and the other for control one and to be selected randomly.
2. Location: Ramallah & Al-Bireh in WB and Khanyounis in GS due to the researchers living place.
3. Gender: Male schools and female schools.
4. The desire and willingness of the school principal to participate and to take the responsibility for facilitating the implementation of the FC and data collection of the pretests and posttests tools in his/her school during second semester of year 2019.
5. The desire and willingness of the concerned teachers: to participate in the FC in their schools and to attend the required meeting with researchers. Each teacher will teach one class in the traditional (normal or conventional) teaching as he/she used to, while he/she will teach the other one according to the prepared FC. In addition, teachers –with the researcher- will be responsible for the data collection of the pretests and posttests tools for the experimental and control students in their schools.

According to the above criteria, four schools were selected. The science, math, IT and English teachers per school were selected. The students were approximately distributed randomly in the classes by school administration. It is not permitted to select random students and put them in one class for implementing the FC. Just all the class students can be selected randomly as a unit. The classes are categorized as (A, B, C …) in each school. Class B is selected randomly to be the experimental group for implementing FC in each school, while class A is the control group. The sample data containing gender groups and location in (WB/ GS) is included in each category of experimental and control groups. The sample data containing gender groups and location in (WB/ GS) is included in each category of experimental and control groups. The respondents are 16 teachers (4 teachers/ school) and 385 grade 9 students in addition to the school principals according to Table 1.

Table 1
Research sample due to location and gender

Location	Gender	Schools Name	Number of Students	
			Control	Experimental
Ramallah & Al-Birch/ West Bank	Male	Ein Misbah	49	47
	Female	Bint Al-Azwar	65	66
Khanyounis/ Gaza Strip	Female	Ahlam Alharazin	35	38
	Female	Ibn Kholdoun	41	44
			190	195
		TOTAL	385	

Research Tools

Seven research tools are used in this research. They are: four AA tests (Science, Mathematics, IT and English subjects), CTS test, PS questionnaire and an open questionnaire for teachers about the advantages and challenges of FC implementation to

be analyzed in a qualitative way. The students' AA tests are prepared by the research team members and school teachers. The PS questionnaire and the CTS test are prepared by the research team members. The CTS is derived and adapted from the California Critical Thinking Skills test that is developed based on the "American Philosophical Association (APA) Delphi Consensus Definition of Critical Thinking" (California_Academic_Press, 2016). The Arabic test version used by Atwa (2017) in his PhD research is suitable for school age children. It revised, adapted to be suitable for grade 9 students' context and it consists of 20 items only with duration of 30 minutes. The standardized original test consists of thirty-four multiple choice items with duration of about 45 minutes, each item has 4 or 5 alternatives with only one correct answer.

The six tools are tested for content validity by a committee of 7 experts from education sectors and university educational faculties due to each tool. Moreover, they are piloted and tested for the internal consistence and reliability. Five closed Facebook groups are created: one as a steering committee for research team members, teachers and school principals to share tools, VLs, ideas and experience (https://www.facebook.com/groups/293059944879365/). The others were for the four subjects. Here is the one for English as an example (https://www.facebook.com/groups/285867422136066/), take in account the Facebook groups are closed that not open for public. All FC experimental students are invited to the concerned group with the help of their teachers.

Implementation and Procedures

Teachers attended face to face meetings inside their schools with at least one of the research team members and viewed selected videos to get good idea about the FC. The students of experimental group are oriented for one session by the research team members in the presence of their teachers and school principal to prepare them for the FC method. A pamphlet about the FC was distributed to the students in order to take it to their parents. This is to raise the awareness about FC, to engage their parents in their SLP and to get their approval for their students' participation in the FC research.

Teachers developed VLs according to their subjects, uploaded them to YouTube channel, while others selected ready VLs from internet. Then sharing VLs to the concerned Facebook group. Students can view the VLs before attending the face-to-face classroom sessions so they are ready for the classroom group work and active learning activities.

Each student of experimental and control groups took three tools: AA subject test, CTS test and PS questionnaire twice: pretest and posttest at the beginning and end of the second semester. i.e. during January 2019 and May 2019 respectively. Each tool includes the general information about the students' demographic factors. The pretest scores are very important to be considered as a baseline data, to compare the homogeneity and to determine the pre- knowledge and skills for students in both groups (Butzler, 2014).

Data Collection

The quantitative collected data from the six tools are grouped and analyzed. The Statistical Package for Social Science (SPSS) package version 20 is used for the quantitative data analysis (Pallant, 2011). Moreover, inferential statistics, involving independent samples t-test and dependent samples t-test are used in this research to determine the differences between the groups. Of course, the differences are considered statistically significant at (α <0.05). Moreover, the qualitative data collected from teachers and school principals are grouped and analyzed manually by using the thematic analysis approach.

FINDINGS AND DISCUSSIONS

Results and Discussion

The six tools are administered twice for the purpose of the pre-test and post-test in order to measure the required variables for students for both groups. The inferential analysis of T-test at the level of significance (α <0.05) is used to test the statistically significant differences for each tool between the experimental and control groups in the Pre-test, Post-test and between the Pre and Post for each group. In general, it is found that the FC implementation affected the CTS, PS and Math AA positively, and it has no effects on other three AA tests (Science, English and IT). The results are as follows:

Critical Thinking Skills CTS:

- There are no statistically significant differences in the CTS test between experimental and control groups in the Pre-test.
- There are statistically significant differences in the Post CTS test between experimental and control groups. The means are (28.9 & 11.3) respectively.
- There are statistically significant differences in the experimental group of CTS test between Post and Pre. The means are (28.9 & 11.2) respectively.
- There are no statistically significant differences in the control group of CTS test between Post and Pre. The means were (11.3 & 12.1) respectively.

Table 2
CTS means for control and exp. in pre-post tests

CTS	Pre	Post
Control	12.1	11.3
Exp.	11.2	28.9

This means that the FC implementation affected the students' CTS.

As a conclusion and in terms of the students' CTS score, it is found that FC students score is better than that of the traditional one as confirmed by Asmara et al. (2019).

The CTS test score is not statistically significant between Post & Pre control groups and between experimental & control groups in the Pre-test. It is significant between Post & Pre experimental and between experimental and control group Post CTS test in favor of experimental one.

Psychological Stress PS:

- There are no statistically significant differences in the PS questionnaire between experimental and control groups in the Pre-test. The means are (2.53 & 3.00) respectively.
- There are statistically significant differences in the Post PS questionnaire between experimental and control groups in favor of experimental one. The means are (2.33 & 2.51) respectively. Take in account that the score value is directly proportional with students PS, i.e., the high score means high stress and low score means low stress.

Table 3
PS means for control and exp. in pre-post test

PS	Pre	Post
Control	3	2.51
Exp.	2.53	2.33

This means that the FC implementation decreases the students' PS.

As a conclusion and in terms of the students' PS score, it is found that FC students score is better (lower) than that of the traditional one. The PS score was not statistically significant between experimental & control groups in the Pre-test, but it is significant in the Post PS between experimental and control group in favor of experimental one. Since the FC environment increasing the interaction between students and teacher, this in turn creates meaningful learning that diminish the stress SLP load as mentioned in earlier studies (Eryilmaz & Cigdemoglu, 2019; Kaur & Kauts, 2020; Kozikoglu, 2019).

Math AA:

- There are statistically significant differences in the experimental group of Math test between Post and Pre in favor of Post. The means were (73.7 & 43.1) respectively.
- There are no statistically significant differences in the control group of Math test between Post and Pre. The means were (39.9& 36.1) respectively.

Table 4
PS means for control and exp. in pre-post test

Math AA	Pre	Post
Control	36.1	39.9
Exp.	43.1	73.7

This means that the FC implementation affected the students' academic achievements in Math subject and this is in agreement with (Wei et al., 2020).

Science, English & IT AA:

Due to this research, the FC implementation does not affect significantly the AA for Science, IT and English.

As a conclusion and in terms of the students' Math achievement score, it is found that FC students score is better than that of the traditional one; the Math test score is not statistically significant between Post and Pre control groups; while it is significant for the experimental group in benefit of the Post test. The main findings of this research is

that the FC method is effective and affecting the academic Math achievement positively. This is in agreement with Fulton (2012) research results concerning Math students and with Santos and Serpa (2020) in improving the AA in general.

Benefits and advantages of FC implementation:

These are some benefits and advantages of FC implementation due to teachers open questionnaire responses. FC is a new method for students and teachers that they were happy to be part of this research. FC giving students the opportunity to learn using new technology- enabled pedagogy, encourages them to prepare their lessons. The students feel free and react more effectively for being given the opportunity to share and show their own capabilities and skills in the new learning atmosphere in which the students cooperate rather than compete. It helps students to understand deeply, retain knowledge and to use their higher CTS rather than lower skills such as memorizations and repetitions. FC encourages students to participate effectively in the SLP that the interaction time between students and teachers increases inside the classroom; teacher can reach and help all students inside the classroom which is in agreement with Atwa and Sulyeh (2020), Boubih et al. (2020) and Girmen & Kaya (2019). The student-centered approach and personalized learning improved (Al Mulhim, 2021).

This is in line with Abuhmaid (2020) who stated that FC changes teacher's role in the classroom to be facilitator rather than feeder. It strengthens and improves interpersonal relations between students and teachers and among students themselves. It engages and encourages students' parents to share and take responsibility in helping their children in the SLP, and motivating them to do better in their AA tests. This in agreement with (Stratton et al., 2020) that FC increased engagement and motivation for the majority of the students of the research sample. It improves ties and relations between home and school. The results confirm findings from previous studies (Abuhmaid & Abood, 2020; Jdaitawi, 2019; Sutama et al., 2020) which showed that students became more active and their self-confidence improved. Also, some of teachers state that they will implement the FC next year. Moreover, they stated that FC is suitable for all educational subjects.

Challenges and Perspectives of FC implementation:

This part contains the challenges and perspectives of FC implementation due to teachers open questionnaire responses. Some teachers responded that the training and follow up were not enough. They do not know how to use the required technology effectively and do not have the motivation to apply the FC strategy. In addition to that, some students do not have good devices, internet access or Facebook account.

Also, during the FC implementation, teachers suffer from the cuts in their salaries and high life expenses. Although this is apply for male and female teachers, but due to the Palestinian culture, male teachers are responsible for the life expenses for their families. Teachers' salaries were originally low and the new cuts (40%-50%) since the beginning of this 2019 year makes it very difficult to manage life. So, male teachers are not motivated during the FC implantation, while female teachers were motivated and very active.

Teachers' suggestions for improving the FC implementation are: train teachers on FC implementation with examples, models and provide them with the required tools (software and video camera) to apply it effectively. More monitoring and follow up for teachers and students during FC implantation. Increase the number of video lessons and shorten their length to be less than five minutes.

CONCLUSION AND RECOMMENDATIONS

This research finding is supported by previous studies for secondary school students. Integration of FC in the SLP can make learning more fun, engaging and productive (Boubih et al., 2020; Girmen & Kaya, 2019; Hamdan et al., 2013). The FC significantly affected students' achievement and provides students with opportunity to be active learners and take control of their learning (Atwa et al., 2016; Strayer, 2012). In conclusion, it is clear that the findings show that the FC is effective for improving the students' academic achievement in Math. By increasing the interaction time inside the classroom, the personalized learning achieved and the SLP improved. Introducing the FC in the SLP is a challenge for students, teachers and schools. Students who are accustomed to the traditional learning style need time to get used to a new one (Tucker, 2012). It needs shift in the mind of all stakeholders of the educational process (Roehl, Reddy, & Shannon, 2013).

Flipped Classroom FC or flipped learning approach is a new and suitable trend for digital students in ICT during the last decade. It is an inversion of the traditionally teaching and learning methods in which students prepare lessons at home then do the activities in the classroom (Al-Zoubi & Suleiman, 2021). It is important to say that FC project is complying with the Palestinian MOEHE digitization slogan, particularly, when studies show that only 9% of Palestinian secondary schools uses digital tools.

FC implementation results in statistically significant difference between controlled and experimental groups in favor of the latter one in CTS, Math and PS. It reduces the students PS and improves their achievements in both Math and CTS. On the other hand, findings show insignificant differences in Science, IT and English. But, at the same time, those students got higher scores than traditionally learning groups. For effective and proper FC implementation, it is required to train teachers, parents and students on the technological techniques and provide schools with the necessary digital tools such as software and video cameras. It also needs more monitoring and following up for all persons involved in the project.

FC maximizes interaction time inside classroom between the students and teacher and among students themselves. It also strengthens the interpersonal relationships between teachers and students and even among students themselves. By this the teacher role changes from "Sage on the stage to Guide on side". In other words, he becomes facilitator rather than feeder in the teaching and learning process. FC helps decision makers at the Ministry of Education MOE to modify the textbooks and training courses to fit ICT applications.

The recommendation is to implement the FC for other subjects and for long periods. It is recommended also that the school make orientation and preparation for the students and

implement the FC step by step. The following issues should be considered before applying the FC approach, and MOEHE should find solutions for these problems.

Issue 1- Will teachers accept to apply the FC approach in their schools? If teachers agree to adopt this technique in their classrooms, they should be aware of the obstacles they may encounter in implementing this FC approach such as:

- The shortage of technological software and tools at schools. How could they overcome this obstacle to achieve the desired output of the project?
- Another point is that if the teachers have the desire and ability to make VLs for the contents of the text books they teach. They need training courses for this task. In addition, teachers are heavily loaded with a lot of projects offered by many organizations through MOEHE. Do teachers have the sufficient time to do such tasks of FC among other financial problems they suffer from?

Issue 2- Is it possible to apply FC approach at Palestinian schools in the future? The following issues should be considered:

- There are three types of schools: Governments (Public), UNRWA and Private.
- There are three geographical areas: Jerusalem, WB and GS.
- Budgeting for internet access and technological software and tools.
- Training courses for teachers about FC in addition to orientation sessions for supervisors, school principals, students and parents.
- Teachers' motivation and incentives.

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REFERENCES

Abuhmaid, A. (2020). Teachers' Perceptions on the Impact of Flipped Learning on Student Learning and Teacher's Role in Jordanian Schools. *Universal Journal of Educational Research, 8*(3), 1007-1016.

Abuhmaid, A., & Abood, M. (2020). The impact of flipped learning on Procrastination and students' attitudes toward It. *Universal Journal of Educational Research, 8*(3), 566-573.

Adom, D., Essel, H. B., & Chukwuere, J. (2020). The State of Academic Stress in the Higher Institutions of Ghana: The Way Forward. *Universal Journal of Educational Research, 8*(2), 321-331.

Al-Zoubi, A. M., & Suleiman, L. M. (2021). Flipped Classroom Strategy Based on Critical Thinking Skills: Helping Fresh Female Students Acquiring Derivative Concept. *International Journal of Instruction, 14*(2), 791-810. doi:https://doi.org/10.29333/iji.2021.14244a

Al Mulhim, E. N. (2021). Flipped Learning, Self-Regulated Learning and Learning Retention of Students with Internal/External Locus of Control. *International Journal of Instruction, 14*(1). doi:https://doi.org/10.29333/iji.2021.14150a

Asmara, R., Kusumaningrum, W., Wulansari, A., Munirah, M., & Hersulastuti, H. (2019). *Measuring the Effects of A Flipped Classroom Model on Critical Thinking Skills*. Paper presented at the 2nd Workshop on Language, Literature and Society for Education, Indonisia.

Atwa, Zaher, & Sulyeh, Yaman. (2020). Students'Perceptions towards Flipped Learning through Science Teaching [Ettijahat Attalabah nahwa Atta'allum Alma'akoos min Khilal Ta'aleem AlO'loom]. *Al-Utroha Magazin, 5*(5), 21-43.

Atwa, Z. (2017). *The Effects of Flipped Learning in Physics Teaching on Secondary Students' Motivation, Achievement and Critical Thinking* (PhD), National University of Malaysia (UKM), Kuala Lampur, Malaysia.

Atwa, Z., Din, R., & Hussin, M. (2016). Effectiveness of Flipped Learning in Physics Education on Palestinian High School Students' Achievement. *Journal of Personalized Learning, 2*(1), 73-85.

Ayçiçek, B., & Yanpar Yelken, T. (2018). The effect of Flipped Classroom Model on students' classroom engagement in teaching English. *International Journal of Instruction, 11*(2), 385-398. https://doi.org/10.12973/iji.2018.11226a.

Bergmann, J., & Sams, A. (2012). *Flip Your Classroom: Reach Every Student in Every Class Every Day*: International Society for Technology in Education (ISTE).

Boubih, S., Aidoun, A., El Alaoui, M., & Idrissi, R. J. (2020). The Effectiveness of the Flipped Classroom in a Teacher Training Context. *Universal Journal of Educational Research, 8*(11B), 6061-6071.

Butzler, K. B. (2014). *The Effects of Motivation on Achievement and Satisfaction in a Flipped Classroom Learning Environment.* (PhD Ed.D.), Northcentral University. ProQuest Dissertations & Theses Global database.

California_Academic_Press. (2016). Insight Assessment, California critical thinking skills test CCTST user manual: California Academic Press, San Jose, CA.

Chao, C. Y., Chen, Y. T., & Chuang, K. Y. (2015). Exploring students' learning attitude and achievement in flipped learning supported computer aided design curriculum: A

study in high school engineering education. *Computer Applications in Engineering Education, 23*(4), 514-526.

Clark, K. R. (2013). *Examining the effects of the flipped model of instruction on student engagement and performance in the secondary mathematics classroom: An action research study.* (D.Ed.), Capella University, Ann Arbor. ProQuest Dissertations & Theses Global database.

Creswell, J. W. (2012). *Educational Research : Planning, Conducting, and Evaluating Quantitative and Qqualitative Research* (4th ed.). Boston: Pearson Education, Inc.

Eryilmaz, M., & Cigdemoglu, C. (2019). Individual flipped learning and cooperative flipped learning: their effects on students' performance, social, and computer anxiety. *Interactive Learning Environments, 27*(4), 432-442.

Fulton, K. (2012). Upside down and inside out: Flip Your Classroom to Improve Student Learning. *Learning & Leading with Technology, 39*(8), 12-17.

Girmen, P., & Kaya, M. F. (2019). Using the Flipped Classroom Model in the Development of Basic Language Skills and Enriching Activities: Digital Stories and Games. *International Journal of Instruction, 12*(1), 555-572. doi:https://doi.org/10.29333/iji.2019.12136a

Hamdan, N., McKnight, P., McKnight, K., & Arfstrom, K. (2013). The flipped learning model: A white paper based on the literature review titled a review of flipped learning. *Arlington, VA: Flipped Learning Network*.

Jdaitawi, M. (2019). The Effect of Flipped Classroom Strategy on Students Learning Outcomes. *International Journal of Instruction, 12*(3), 665-680. doi:https://doi.org/10.29333/iji.2019.12340a

Karlsson, G., & Janson, S. (2016). The flipped classroom: A model for active student learning. *F r om books to MOOCs*, 127-136.

Kaur, A., & Kauts, A. (2020). Effect of Flipped Classroom Instructional Strategy on Academic Stress. *Journal of Xidian University, 14*(5). doi:https://doi.org/10.37896/jxu14.5/270

Khaldi, M. M. M., & kishek, W. M. I. (2020). The New Palestinian Science and Math Curricula in Light of the 21st Century Skills: A Critical and Enlightening Study. *International Journal for Research in Education, 44*(3), 268-293.

Kozikoglu, I. (2019). Analysis of the Studies Concerning Flipped Learning Model: A Comparative Meta-Synthesis Study. *International Journal of Instruction, 12*(1), 851-868.

MOEHE. (2016). *Result-Based Monitoring & Evaluation System 2015*. Ramallah - Palestine: Ministry of education and Higher Education.

MOEHE. (2017). *Education Sector Strategic Plan 2017-2022*. Directorate General for Educational Planning, Ministry of Education and Higher Education, Palestine.

Pallant, J. (2011). *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using SPSS* (fourth edition ed.): McGraw-Hill International.

Panopto. (2016). 7 Unique Flipped Classroom Models — Which is Right for You? Retrieved from https://www.panopto.com/blog/7-unique-flipped-classroom-models-right/

Roehl, A., Reddy, S. L., & Shannon, G. J. (2013). The flipped classroom: An opportunity to engage millennial students through active learning strategies. *Journal of Family & Consumer Sciences, 105*(2), 44-49.

Santos, A. I., & Serpa, S. (2020). Flipped Classroom for an Active Learning. *Journal of Education and E-Learning Research, 7*(2), 167-173.

Siahaan, P., Setiawan, Y. C., Fratiwi, N. J., Samsudin, A., & Suhendi, E. (2020). The Development of Critical Thinking Skills and Collaborative Skill Profiles Aided by Multimedia-based Integrated Instruction on Light Refraction Material. *Universal Journal of Educational Research, 8*(6), 2599-2613.

Stratton, E., Chitiyo, G., Mathende, A. M., & Davis, K. M. (2020). Evaluating flipped versus face-to-face classrooms in middle school on science achievement and student perceptions. *Contemporary Educational Technology, 11*(1), 131-142.

Strayer, J. F. (2012). How learning in an inverted classroom influences cooperation, innovation and task orientation. *Learning Environments Research, 15*(2), 171-193. doi:http://dx.doi.org/10.1007/s10984-012-9108-4

Sutama, Prayitno, H. J., Ishartono, N., & Sari, D. P. (2020). Development of Mathematics Learning Process by Using Flipped Classroom Integrated by STEAM Education in Senior High School. *Universal Journal of Educational Research, 8*, 3690-3697. doi:10.13189/ujer.2020.080848

Threlkeld, H. (2017). *Flipped Learning: Understanding the Flipped Classroom through the student experience.* (Master), University of Oslo, Norway.

Trilling, B., & Fadel, C. (2012). *21st century skills: Learning for life in our times*: John Wiley & Sons.

Tucker, B. (2012). The flipped classroom. *Education Next, 12*(1), 82-83.

Wei, X., Cheng, I. L., Chen, N.-S., Yang, X., Liu, Y., Dong, Y., Zhia, X., Kinshuk. (2020). Effect of the flipped classroom on the mathematics performance of middle school students. *Educational Technology Research and Development, 68*(3), 1461-1484. doi:10.1007/s11423-020-09752-x

Yildirim, F. S., & Kiray, S. A. (2016). Flipped Classroom Model in Education. *Research Highlights in Education and Science 2016*, 2.

Zainuddin, Z., & Halili, S. H. (2016). Flipped Classroom Research and Trends from Different Fields of Study. *The International Review of Research in Open and Distributed Learning, 17*(3).