

An analysis of the trajectory of the influence of threefold factors - inverse classes, self-efficacy, and academic performance among online students.

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ABSTRACT

This study attempted to test the direct and indirect effects of the online flipped classroom strategy, and self-efficacy, on the grade point average (GPA) through pathway analysis. The study participants are 204 online learners from the College of Science and Arts - Qassim University. The results of the study reveal good agreement with the proposed model. The relationships in the research model show that the flipped classroom strategy through e.learning applications has a direct positive effect on the students 'average grades and that self-efficacy has a direct positive effect on the GPA, except for modelling and alternative learning that has an indirect effect on the GPA, by means of self-efficacy and the flipped classroom strategy. The results of study providing an enhanced understanding of the importance of self-efficacy in increasing the GPA of female students in the flipped classroom experience online..

Key words: flipped classroom, self-efficacy, e-learning app

ملخص الدراسة

تحاول هذه الدراسة اختبار التأثيرات المباشرة وغير المباشرة لإستراتيجية الفصل الدراسي المقلوب عبر تطبيقات الإنترنت المختلفة، والكفاءة الذاتية، على المعدل التراكمي للطلاب (GPA) من خلال استخدام نموذج تحليل المسار (Path Analysis). شارك في هذه الدراسة 204 طالبة من كلية العلوم والآداب - جامعة القصيم. أظهرت الدراسة أن إستراتيجية الفصل الدراسي المقلوب من خلال تطبيقات الإنترنت المختلفة لها تأثير إيجابي مباشر على المعدل التراكمي، و اثبت من خلال الدراسة بان للكفاءة الذاتية تأثير إيجابي مباشر على المعدل التراكمي، باستثناء محور النمذجة والتعلم البديل له تأثير غير مباشر على المعدل التراكمي للطلاب. وخلصت نتائج هذه الدراسة الى ضرورة الكفاءة الذاتية في زيادة المعدل التراكمي للطلاب في تجربة الفصول الدراسية المقلوبة عبر تطبيقات التعلم الإلكتروني المختلفة.

الكلمات الأساسية: الفصل الدراسي المقلوب، الكفاءة الذاتية، تطبيقات التعلم الإلكتروني.

1. INTRODUCTION

In light of the new character of the instructor, and the spread of technology and the increase in demand for it; It is commanded to discover new teaching methods centred around the learner away from the traditional, so as to hold the learner's activity, vitality and integration within the classroom all the time through education and preparation activities. In addition, good instructional strategies need to consider the learner's motivation to learn, so that the student's academic performance will increase. Their learning will improve the more they desire to meditate and the greater their motivation towards it (M-Sliti, 2015) There is an urgent demand for the emergence of the flipped classroom strategy,. Especially this strategy aims at identifying some of the problems that students with short-term memory may encounter; the information and knowledge they do not stay permanently. The flipped classroom strategy is based on a foundation supported by the constructivist theory that is based on the learner, as well as active learning, and this theory helped spread the flipped classroom strategy, which

indicates that the learner takes responsibility for his learning, as he is independent in his learning and searching for knowledge, after the content reaches the learner , The classroom turns into a workshop in which activities, exercises and assessment are practiced (Bishop & Verleger, 2013). the flipping classroom learning is one of the newly emerging forms of built-in e-learning and is defined as an educational model aimed at using modern techniques and the Internet in a way that allows a teacher to prepare a lesson via video clips, audio files or other media, for students at home or elsewhere using their computers, smart phones or tablets before attending a lesson, while lecture time is devoted to discussions, projects and training.(Najib,2014) Learning students through the flipping classroom requires the participation of learners with the responsibility of thier learning both inside and outside the classroom and designing participatory attitudes related to the characteristics of learners that drive them towards confidence in what they learn (H. Al-Zein, 2015). These skills are defined as "the ability of a small participatory group of learners to perform a task or to achieve a planned common goal, in a timely and efficient manner that is required to be achieved using methods of communication, effective communication, problem-solving and teamwork, as well as through individual and collective responsibility" (Khalifa, Zainab,2008). Flipped classroom is a “pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter” (The Flipped Learning Network, 2014). There are many qualities that a successful student of knowledge possesses, including: Self-efficacy, which means the ability to perform tasks successfully, acceptance of responsibility, as the student is primarily responsible for his own results and the experiences that he can obtain. Self-motivation, the successful student has the ability to motivate and encourage himself until he reaches his goal. Possessing emotional intelligence. Self-confidence, by seeing himself able to face difficulties and challenges, in addition to being loved by others. Having beneficial

or friendly relationships with others, which helps him achieve his dreams and goals. Owning self-management, so that he is able to take the necessary decisions and actions he needs.

Self-efficacy beliefs are an important dimension of an individual's personality. One's beliefs about himself are an important basis for determining his behaviour, social and emotional domains. The results of many studies have indicated the importance of self-efficacy beliefs, as self-efficacy beliefs allow the individual to develop his capabilities related to planning, carrying out tasks and assessing actions, and developing self-control around learning (Mustafa, Akram, 2015), in addition to the individual perceptions about his own competence playing an important role..:

The assessment of some individual characteristics and academic achievement on a theoretical model will contribute to the design and creation of effective online learning environments and flipped learning strategy. Besides, this model will contribute to assessing the relationship between individual characteristics and academic achievement, to reveal direct and indirect effects between variables and control the effects of other variables that may affect success in learning via online flipped classes. When we examine the models that predict students' achievement in online learning, it is noted that these studies are not based on distance education theories and that the academic achievement variable has not been sufficiently studied. (Bahçekapılı, E., & Karaman, S., 2020)

This study aims to develop a model that predicts students' academic achievement in On line learning through flipping classroom strategy and their characteristics such as self-efficacy .(See Figure 1). This research seeks to address the following questions:

1. What are the direct and indirect effects of flipping classroom strategy throw online learning apps and students' self-efficacy on academic achievement?

2. What are the effects of direct and indirect effects of flipping classroom strategy on students' self-efficacy ?

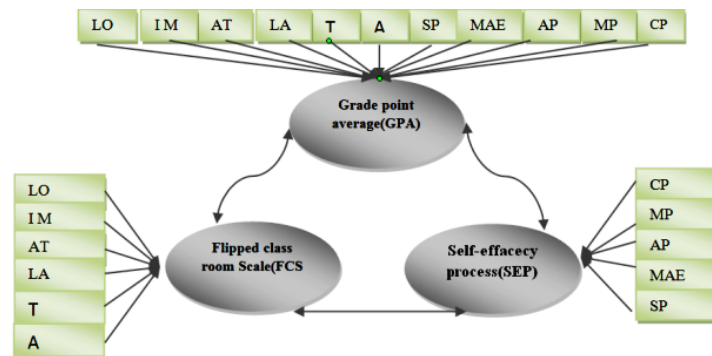


Fig. 1.: Graphical view of ThreeConstructs' proposed model in Measurement Model.

Flipped classroom scale (LO: learning objective, IM, instructional material, AT, assessment tools, LA, learning activities, T: technology, A: accessibility) self efficacy (CO; cognitive process, MP: motivational process, Efficacy Processes, MAE: Modelling and Alternative Education. SP: Social persuasion from others

1.2. Limitations

Since the number of interrogations in the survey tool used in the search was comprehensive and most of the information was obtained through an online form, this may affect the answers provided to the survey instrument. The data obtained in the study are limited by the online learners studying in the academic year 2019-2020 in two different colleges of Qassim University. The results of the study should be evaluated in terms of university distance education systems.

2. Research framework

To conduct the study, the goals of the study are dependent on certain theories:

2.1. Design and Implementation of flipped classroom learning environments

In this study, we revise many literatures related to flipped classroom, such as, (6-step guide to flipping your classroom which presented 6 easy steps for implementing flipped classroom (plan, Record, share, change, group, regroup, After the six steps, Review, Revise, and Repeat(J,Dunn, 2014)

Four pillars flipping stand for (see fig. 1) The implementation standards e. Course Additionally, we use the revised Bloom's taxonomy (fig.2) All the literature that was referred to was used to prepare the educational units for the students, and at the end of the semester, the questionnaire was published, which was designed using the literature of the flipped classroom and the skills of instructional design to ensure the effectiveness of the program and the students' satisfaction with it.

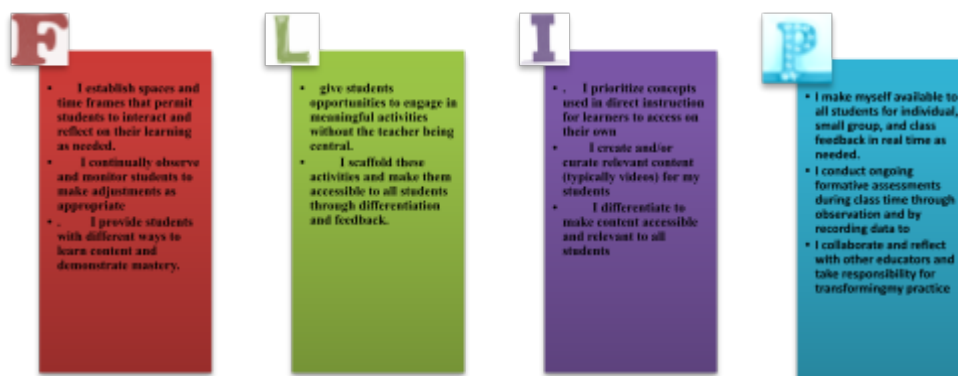


Fig.2. The Four Pillars of F/L/I/P..

Table 1.Six - factor model to design and flipping classroom

Area	Procedure
Learning objectives	<ol style="list-style-type: none"> 1- Analysing the educational content to choose the main objective of the unit 2- State clearly the goals of the proposed unit
Structural material	<ol style="list-style-type: none"> 1- Organizing the content and its presentation 2- Designing teaching aids and learning resources 3- To achieve the objectives of the course. (Prerecording unit, pre videos, e. Books, pictures.. 4- Determining course strategies: Several strategies have been used, the most important of which is Problem-based learning (PBL). 5- Build a guide for the student in order to help the student to go through the course. This scheme included the following: the general objective of the course, the objectives of each educational unit and the topics it contains, the educational activities and the method of implementation, the study schedule
Assessment tools	<p>measuring course effectiveness depending on:</p> <ol style="list-style-type: none"> 1- Performances: They represent the performance that student teachers do during the study of the course, such as participation and interaction within the course, use of e-mail, participation in the chat room and expressing opinions.

	<p>2- Productivity: Production consisting of accomplishing the required tasks, such as publishing pictures, videos, or audio recording, making assignments. And others.</p> <p>3- Determining the evaluation method and tools: Pre-evaluation before the experiment- Formative evaluation during the experiment and The final evaluation is done through the application of dimensional research tools and the productivity of the student tasks and assignments as well as the post tests for each unit and the general examination of the course.</p>
Learning activities	<p>Defining educational tasks and activities</p> <p>1- using search engines and websites to accomplish learning tasks, collecting pictures, writing a report, participating in discussion panels,</p> <p>2- communicating with colleagues through classroom discussions over the web, sending and receiving emails, uploading some files, ..</p> <p>3- Producing images related to educational technology and presentations.</p>
Technology	<p>1- using collaborative tools to share the lesson to students</p> <p>2- using video technique</p> <p>3- using black board efficiently</p> <p>4- using e, mails and social application tools</p>
Accessibility	<p>1- be sure through any means of above to deliver video lessons to any students registered in the course</p> <p>2- Every student must access to recorded videos</p>

2.1.2. Fitting with the revised Bloom's Taxonomy

In the flipped classroom model, learning is flipped. As you can see from the pyramid, students can finish the remember and understanding level of cognitive work before class. And when they come to class, they can engage in middle and higher cognitive levels of learning with peers and teacher present. See fig. 3

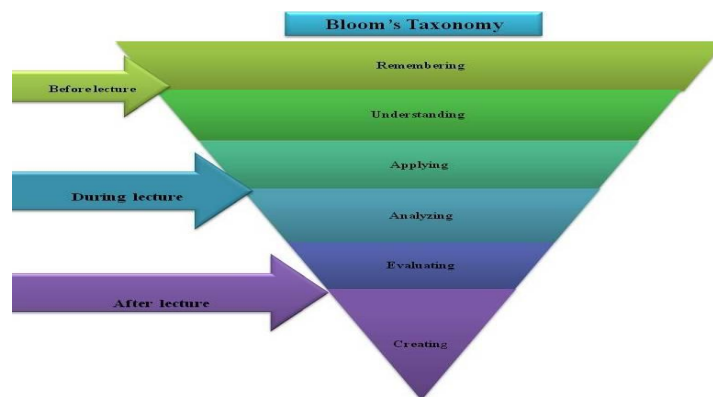


Fig.3. revised Bloom's Taxonomy

2.2 Self –Efficacy

Perceived self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self efficacy beliefs determine how people feel, think, motivate themselves and behave. Such beliefs produce these diverse effects through four major processes. They include cognitive, motivational, affective and selection processes (Bandura,1997).

Table .2. Self –Efficacy Mechanism

Self-efficacy Processes	Function
Cognitive processes	Personal goal setting is influenced by aptitude Self -efficacy. The greater the power of Self -efficacy, the greater the goal people set for themselves and the stronger their commitment to them.
Motivational Processes	Achievement of the goal, even if it is small. The more you accomplish your goals, the more confident you will become.
Modelling and Alternative Education	Observing others to perform a task may increase an individual's self-efficacy.
Efficacy Processes	Reduced anxiety about certain tasks may increase an individual's self-efficacy.
Social persuasion from others	encouragement and support contributes to increasing self-efficacy

3. METHOD

3.1. Participants

The sample of the study is 201 female students (41 female from Science Collage, 160 female students from art collage), studying in two different colleges in Qassim university; their age varies between 19 and 25 (M = 22.0). The participants in both colleges attend an electronic learning. The participants attend their classes in a live class environment at a planned time. A recorded or video lessons are sent to students via blackboard app. Before two days of life lessons, the instructor teaches the lesson live with the help of a whiteboard, presentation, and

other materials in online learning environments. The participants engage vocally in the lesson when required by the instructor, and they may communicate with all participants and the instructor instantly during the lesson by using the chat option or microphone. Students can access the lesson taught live and access the documents related to these courses. Both colleges provided technical support to the participants via telephone and e-mail. The participants take the midterm exams online, but the final exam in a classroom as a proctoring the exam. While the midterm exams have 30% of the total grade, the final exams possess 70% of the total grade.

3.2. Measures and instruments for data collection

For data collection, three different scales were used. These are namely: the four –polar model of flipping classroom scale, the academic achievement of students' scale and general self-efficacy scale. Below is the explanation of each tool.

3.2.1 - flipped classroom Scale:

In this study, we use scales to measure student satisfaction about utilizing flipped classroom in six levels, it consists of 40 items to measure student satisfaction level about using flipped classroom .And the levels are: Learning objectives, assessment, structional materials, learning activities, technology, accessibility.

3. 2. 2. -Academic achievement

In this study, as an indicator of the academic achievement of the student GPA used. The GPA is a number that represents the average value of the final grades accumulated in the courses at the end of the first semester. The GPA value ranges from 0 to 4. GPA values are obtained from the student's page on the Qassim University web site..

3.2.3. The five-factor model of self efficacy

This scale was used to measure the main personality variables in the model. The five factor model of personality scale consists of 28 items to measure self efficacy. There are 5 items in “cognitive process” and “motivational process ” factors, while 5 items exist in “Affective Processes” and “modelling Processes” factors and 6 items exist in the “Social persuasion

from others” Factor. The scale is presented to the participants using a 5-point Likert-type scale (“1 = never”, “2 = rare”, “3 = sometimes”, “4 = often” and “5 = always”).

3.3. Data analysis

To validate the hypotheses, model Goodness of fit measures based on the discrepancies between observed and expected frequencies. Likelihood ratio statistic and chi-square goodness-of-fit statistics belong to this category (Evren&Tuna,2012). The proposed model was tested using the Maximum-Likelihood method. The Flipped classroom scale (LO: learning objective, IM, instructional material, AT, assessment tools, LA, learning activities, T: technology, A: accessibility) self efficacy (CO; cognitive process, MP: motivational process, Efficacy Processes, MAE: Modelling and Alternative Education. SP: Social persuasion from others

Table.3. Correlation coefficients between variables of the scales

Variables	LO	SM	LA	T	AT	A	CP	MP	EP	MAE	SP	GPA	WS
LO	1												
SM	.54**	1											
LA	.66**	.59**	1										
T	.35**	.52**	.66**	1									
AT	.31**	.41**	.39**	.42**	1								
A	.48*	.25**	.58**	-.23**	.49**	1							
CP	.43*	.26**	.350**	.610**	.55**	.53**	1						
MP	-.48*	.47**	-.34**	.456**	-.41**	.49*	.471**	1					
EP	.45*	.31**	-.39**	.610**	.32**	.62**	.490**	.47**	1				
MAE	.41*	.41**	.35**	.46**	.48**	.52**	-.329**	.49**	-.13*	1			
SP	.41*	.61*	.36*	.51*	.61*	.41*	.34*	.71*	.46*	.51*	1		
GPA	.45**	.40**	.57**	.76**	-.13*	.25**	.35**	.55**	.45**	-.229**	.61*	1	
WS	.81**	.29	.81**	.809*	.87**	.919**	.872**	.66*	.73*	.65*	-.33**	.597**	1

*Significant at (0.05) **Significant at (0.01)

Flipped classroom scale (LO: learning objective, IM: instructional material, AT: assessment tools, LA: learning activities, T: technology, A: accessibility) and self-efficacy (CP: cognitive process, MP: motivational process, EP : efficacy processes, MAE: modelling and alternative education, SP: social persuasion from others GPA: Academic achievement WS: Whole scale .

prerequisite for using the maximum likelihood approach is multivariate normality (T.W. Anderson, I. Olkin, 85) and multivariate normal distribution was confirmed. According to(Kline, R. B. 2011)“PLS path models can and should be assessed globally through tests of model fit and approximate measures of model fit”. At the end of the test, the goodness of fit indexes is presented in Table 4.

Table 4. The goodness of fit indexes related to the intended model

Terms	Goodness of fit Statistics	Values	Level of Acceptance
Chi square	χ^2	0.19	$p > 0.05$
Chi square/Degree of freedom	χ^2/df	$3.72/2=1.86$	Should be < 3
Standardised root mean residual	SRMR	.0033	Should be < 0.05
Root mean square error of approximation	RMSEA	0.021	Should be < 0.08
Root mean residual	RMR	0.002	Should be < 0.01
Goodness of fit index	GFI	0.93	Should be > 0.90
Comparative fit index	CFI	0.94	Should be > 0.90

The goodness of fit indexes are related to the intended model shown in Table 4, so it is possible to state that the intended model conforms well. Table 4 shows that the correlation coefficients between the variables are less than 0.9. This indicates that there is no multicollinearity problem among the variables of the study (Çokluk et al., 2014)

4. FINDINGS

4.1. Testing the hypotheses revealed in the model

After revealing the goodness of fit, the hypotheses were tested in the model. The first hypothesis stated that there is a positive influence of direct and indirect effects of flipping classroom strategy through online learning apps and of self-efficacy on academic achievement at a statistically significant level of 5%. The direct and indirect effects of the model are presented in Figure 3. Then, the hypotheses were tested according to the significance level of these effects. The direct, indirect and total effects of the variables in the model are presented in Table 5. In light of the data presented in Table 5, the variables included in the model explain 2.5% of the variance in students' GPA. GPA is influenced at most of the LA with an effect size $\beta = .245$, AP with an effect size of $\beta = -0.221$ and by MAE with an effect size of $\beta = .215$. At the same time, these three variables indirectly affect GPA. On the other hand, self-efficacy is directly affected by the Flipped classroom. While some self-efficacy variables take an indirect influencing role on GPA, AP ($\beta = 0.021$), and SE were affected directly and indirectly by LO with an effect size $\beta = .273$ and A with an effect size $\beta = .245$.

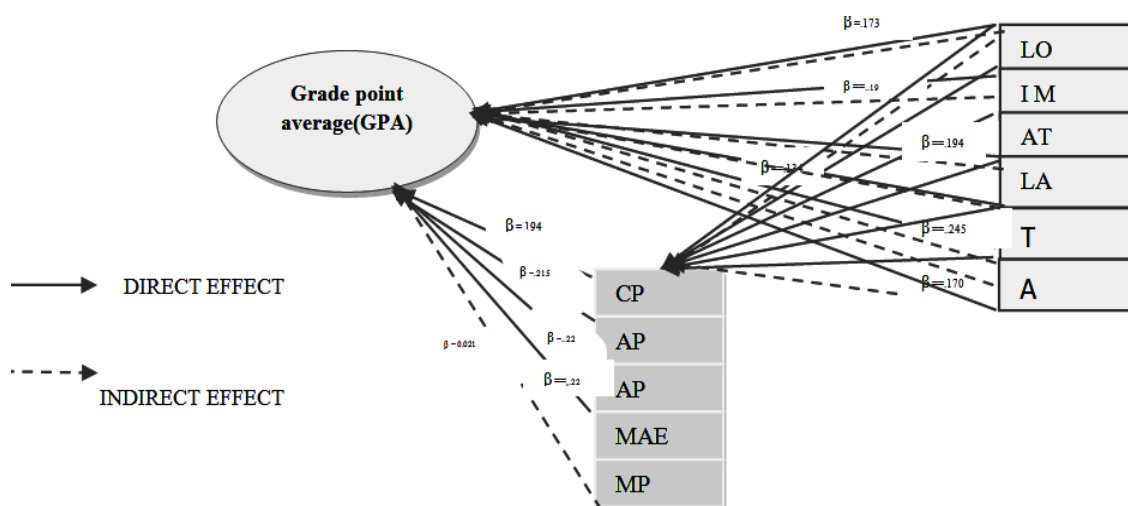


Fig. 4. Significant standardized direct and indirect effects

Table 5. Direct and indirect standardised effects between the variables

Predicted Variable	Predictor Variable	Standardised Effects		
		Direct (β)	Indirect (B)	
GPA (R.SQUARE = 0.025)	LO	.173*	.134*	
	IM	.199*	.106*	
	AT	.194*	.139*	
	LA	.245*	.170*	
	T	.134*	.210*	
	A	.170*	.172*	
	CP	.194*	-.070-	
	MP	0.021	.172*	
	AP	.221*	.210*	
	MAE	.215*	.154*	
	SP	.170*	.104*	
	SE (R.SQUARE = 0.363)	LO	.273*	.154*
		IM	.170*	-
AT		.199*	-	
LA		.194*	-	
T		.211*	-	
A		.245*	.12*	
FCS (R.SQUARE = 0.303)	CP	.170*	-	
	MP	.170*	-	
	AP	.273*	-	
	MAE	.199*	-	
	SP	.194*	-	

***P< 0.05**

The results indicate that as self-efficacy increases, student achievement increases. Academic achievement also increases self-efficacy that is impressed by the motivation that the teacher provides to the students through feedback. Academic achievement through educational activities and quarterly tests contributes positively to a mode of thinking about individual patterns at the end of experiences during students' lifetimes. People who have a pervasive perception of high self-efficacy are more likely to believe in their ability to accomplish a task successfully (Bandura, 1994). The belief that a person can do a job can have a positive impact on academic performance in e-learning environments by using a flipped classroom structure that requires different skills and attributes. Student accountability for learning in online learning environments is more intense than in in-person learning environments. A similar study by (Michael & Voelk, 2004) found that 'Academic performance and its relationship to self efficacy and some variables among university students' academic performance, self efficacy and fraud. This survey proposed to identify the relationship between academic performance and the impact of gender, age and level (male and female students). The research sample consisted of 315 chosen from three colleges The two researchers applied a measure of academic functioning and self-efficacy After conducting the appropriate statistical analyses, the following outcomes were gathered: 1- The existence of a statistically significant relationship counting between age, gender, academic degree, self-efficacy and academic functioning.

In this study, learning activities were identified as having a positive and indirect impact on success. However, influencing the modelling process has an indirect impact on educational outcomes. Asaad (2011) believes that the factors affecting motivation that imitate or do not to imitate the model can be summarised in the following points: factors related to the observed individual, including chronological age and mental readiness, appreciation of the scientific and social standing of the model, personal attractiveness and psychological comfort of the model; factors related to the observed model, including social position, reputation, type); and

factors related to environmental conditions or situational determinants. Learning in the flipped classroom requires more educational responsibility of students. Moreover, learning through the flipped classroom is a new and different learning experience for individuals who have been extensively taught face to face throughout their lives. When these tones of online learning environments are needed into account, it can be anticipated that individuals who are organised, planned, responsible, critical and receptive to new and different ideas will be more academically successful.

The second hypothesis states that there is a positive influence of direct and indirect effects of flipping classroom strategy through online learning apps on self-efficacy at a statistically significant level of 5%. The results of this research reveal that the process of knowledge, motivation and social persuasion from others and cooperation with others will increase academic success along with an individual's perception of success in a job. Self-efficacy beliefs allow an individual to develop his capabilities related to planning, carrying out tasks, evaluating tasks and developing self-control around learning in addition to the individual perceptions about his own competence, which play an important role in academic achievement.) Salha 2015) also found a close link between psychological identity and a sense of self-efficacy; there is a convergence between the convictions related to the ability to perform and achieve and between convictions related to the self (Al-Saadi, 2012). The results confirmed that the higher the use of flipped classrooms, the higher the level of students' self-efficacy and the greater their academic excellence (Al-Harthy & Aldhafri, 2014).

5.CONCLUSION

The use of the flipped classroom strategy has a positive effect on students' learning process in all the scale variables. Personality traits were identified via self-efficacy (cognitive process, motivation, efficacy processes and modelling and impacts such as reduced anxiety from testing) that have significant effects on GPA in the main model. Regarding personality traits

that directly affect academic achievement, on the other hand, it was revealed that the modelling process variable affects academic achievement indirectly.

Individuals who develop high self-efficacy may achieve higher grades and greater levels of achievement. High self-efficacy also helps students to generate actual self-fulfilling capabilities to succeed in learning and achievement.

Individuals who have faith in their effectiveness in problem solving have the ability to think and decide upon surface completion of complex tasks. This is opposite to individuals who have doubts and distrust their self-efficacy when solving problems; their thinking style does not give them the ability to take appropriate decisions when facing problems and slows their thinking when performing work.

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