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The Effect of Using Flipped Classrooms on Developing Mind-Habits and Self-Learning Skills Among the Students at Prince Sattam Bin Abdulaziz University

Asma Abdulrahman Nami Alshaikh, *Associate Professor in Curricula and Teaching Science Methods, Prince Sattam Bin Abdulaziz University, Kingdom of Saudi Arabia, dr.asma1@hotmail.com, a.alshaikh@psau.edu.sa;*

Abstract. This research aims to identify flipped classrooms' impact on developing mind-habits and self-learning skills among female students at Prince Sattam Bin Abdul-Aziz University. The research has adopted the quasi-experimental methodology. The research sample consisted of (68) female students in the Faculty of Education at Prince Sattam Bin Abdul-Aziz University. The sample was divided into two groups, i.e., control and experimental. According to the flipped classroom strategy, educational materials were prepared, mind scale and self-learning skills to achieve the research objectives. The research results have shown the tremendous impact of flipped classrooms on developing minds and self-learning skills among the experimental group's female students. The research has recommended arranging training courses for teaching staff members in Saudi universities considering these results. It would familiarize them with the importance of using flipped classrooms with their students and would instruct them to apply these. It is also emphasized to conduct studies to determine the attitudes of teaching staff members in Saudi universities to flipped classrooms.

Keywords: Flipped classrooms, mind-habits, self-learning skills

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INTRODUCTION

The current century is witnessing a tremendous information revolution in all areas of life. This is evidenced by the rapid developments in information technology and the multiplicity of communication means and electronic communication. These developments are considered as challenges for all around the world, including the Kingdom of Saudi Arabia. There is a need to pay attention to developing students' capabilities and skills to enable them to absorb renewable knowledge and employ it in their lives to cope with the demand of the time. The past decades have witnessed severe attempts to develop various educational curricula and programs with the emergence of internet networks (Al-Juhani and Al-Rahili, 2016). The most prominent is the flipped classroom. It is an educational model for one of the blended learning forms where the traditional lecture and typical duties have changed to another curriculum which allows the teacher to prepare lectures using video clips, audio files, or other media for students to view these in their homes or anywhere else using their computers, smartphones or tablets before attending the lecture.

In contrast, the lecture's time is devoted to discussions, training, and projects (Zahid and Ruwais, 2017). Kozikoglu (2019) believes that the flipped classroom is an effective and innovative educational model. Primarily, it has changed the teaching concept from teacher-centered teaching to the concept of student-centered teaching. The flipped classroom ensures fair use of lecture time and provides immediate feedback to learners in the classroom (Zard, 2019). It allows the student to self-study at a suitable time. It also enhances communication and cooperation between students and their teachers (Al-Farhan, 2015). The flipped classroom can be succeeded by providing a flexible learning environment (Su and Shen, 2018).

The results of many previous studies have shown the effectiveness of the flipped classroom in developing many variables related to the learning process, especially among undergraduate students, including the development of motivation for learning and diverse thinking (Al-Muzaffar and Abu Mughanem, 2020). The flipped classroom also develops physical strength (Atwan, 2020). It enhances academic achievements (Huang et al., 2020; Koo, 2016; Al-Saadoun, 2016). It promotes the development of self-learning skills (Al-Ghamdi, 2017). It improves students' performance in learning the English language (Onaiba and Braiek, 2018). It augments the critical thinking skills (Al-Attiyah, 2018). It increases reading comprehension skills in the English language (Karimi and Hamzavi, 2017). Besides, flipped

classrooms develop self-organization skills and social communication among university students (Jdaitawi, 2019). However, some obstacles have prevented the application of virtual classes (Al-Ibrahim and Al-Manea, 2018). Positive attitudes exist among students towards applying the flipped classrooms (Huang et al., 2020; Koo, 2016; Al-Faleh, 2018). Strengthening the mind-habits of students leads to an increase in the students' learning level and abilities. The mind-habits are essential as these facilitate students learning and employ the experiences (Ayasrah, 2012). These are defined as a set of skills, attitudes, and values that enable the individual to build smart performances (Nofal, 2008). Costa and Calic (2003) have presented a list of sixteen mind-habits (perseverance, control recklessness, listen with understanding, think flexibly, think about thinking, striving for accuracy, questioning and posing problems, applying past knowledge in new situations, thinking and communicating clearly and accurately, collecting data using the senses, creating-visualizing-innovating, responding with amazement & fear, taking responsible risks, reciprocal thinking, finding humor, and constant willingness to learn continuously).

Gad (2017) has indicated the effectiveness of using the aquarium strategy in developing mind-habits among Mathematics division students at the Education College. Besides, contemporary technical and scientific developments have led to an increase in self-learning interest. It achieves learning commensurate for each learner according to his abilities and learning speed. It also depends on his motivation to learn (Kora, 2013). Self-learning skills are essential skills necessary for effective learning. These are desired in a society that aims to continue learning and keep pace with scientific and technological progress (Al-Radadi, 2019; Egizii, 2015). These enable the learners to solve their problems and create a fertile environment for creativity (Al-Harbi, 2017). Hassan (2012) has shown the effectiveness of using a website based on constructivism theory in developing self-learning skills among educational technology students. Abdul-Salam (2013) has indicated the effect of using cognitive journey strategies in developing self-learning skills. Muhammad (2017) has indicated the effectiveness of using the Edmodo platform in developing self-learning skills among diploma students at the Education College. It is required to adopt modern teaching strategies, educational activities, and modern evaluation methods to develop mind-habits among undergraduate students and train them with self-learning skills (Al-Harishi, 2014; Al-Harbi, 2017; Daoud et al., 2019). There is a statistically significant correlation between mind-habits and self-regulation skills for learning (Al-Farhan, 2015). Mind-habits are useful in developing self-regulation skills for learning (Khalil, 2020).

Saudi Arabia Kingdom's 2030 vision has stressed the need to pay attention to raise higher education graduates' level to keep pace with the era of development and information explosion. Therefore, it has become imperative for universities to change their traditional systems and develop modern teaching strategies, activities, and evaluation methods. Some studies have recommended developing thinking skills, mind-habits, and self-learning skills (Al-Shami, 2010; Lubna, 2018; Hazard, 2013). The first and second international conference for e-learning & distance education (2006, 2011) and the national e-learning center (2020) have also emphasized supporting self-learning skills. Al-Omari and Al-Shanqeeti (2019) have revealed that the degree of self-learning skills for female students at Taibah University was useful. It has also recommended the need to develop self-learning skills among undergraduate students. We have noticed the decline of some mind-habits and self-learning skills among Prince Sattam bin Abdulaziz University students. This study is intended to benefit from e-learning, information, and communication technology in developing many variables among higher education students. It aims to apply flipped classrooms in education and measure their impacts on developing mind-habits and self-learning skills of female students at Prince Sattam bin Abdulaziz University. It also discovers the relationship between mind-habits and self-learning skills.

METHODS

The research has used the experimental method according to the semi-experimental design. It is the method by which the effects of the independent variable (the flipped classrooms) can be determined on the dependent variables (mind-habits and self-learning skills) (Al-Assaf, 2006). The research sample was consisted of (68) female students of the Department of Curricula and Teaching Methods at the Education College, Prince Sattam bin Abdulaziz University. It was sub-divided into experimental and control groups with (33) and (35) students in each group, respectively. It was applied with the pre-and post-application of the two research tools (mind-habits scale and self-learning skills scale). The experimental group was taught using the flipped classroom method, while the control group was educated by the traditional method through the lecture. Table (1) illustrates the design of the research experiment.

Table 1. *The experimental and control groups design with pre-and post-application.*

Study group	Pre-application	Experimental process	Post-application
Experimental group	Mind-habits scale and self-learning skills scale	The flipped classroom	Mind-habits scale and self-learning skills scale
Control group		The traditional lecture	

The research aimed to measure using flipped classrooms on developing mind-habits and self-learning skills among Prince Sattam bin Abdulaziz University students. Experimental processing materials were prepared using the following strategies. The first 10 topics were selected from the General Teaching Strategies course, and the desired learning outcomes were determined. These topics were active learning, cooperative learning strategy, self-inquiries, brainstorming, KWL self-learning schedules, problem-solving, concept maps, cognitive maps, role-playing, and reciprocal teaching. The educational material for the first stage of the flipped classroom was prepared; that is, the pre-school stage. It was accomplished by providing the content of the lectures, including video clips related to the topics of the course and links to YouTube, an educational platform on how to apply the teaching strategies, electronic books available on the Saudi digital library, and presentations with audio recordings to explain the lectures. The internet was acquired to achieve learning outcomes.

Moreover, the educational activities through the educational materials were prepared, conceptual maps were designed, and work was organized with schedules. It was ensured that the students were aware of the content at home or in a place suitable for them outside the classroom. All educational materials were uploaded on the course page on the blackboard for students to view before the lecture and submit the required report on the homework page. The faculty member makes sure that all students have seen these before the lecture. Finally, educational activities and training for the second stage in the classroom lecture were prepared. These allow the use of mind-habits among the students. It allows them to interact and cooperate and arouse curiosity to see the additional educational materials. Hence, the students are motivated to research and review the educational materials provided.

Research Tools

A two-scale research tool was prepared to achieve the research objectives. It consisted of the mind-habits scale and self-learning skills scale. For the mind-habits scale, the goal of the scale was to measure six mind-habits. These were perseverance, thinking flexibly, thinking about thinking, applying previous knowledge to new situations, reciprocal thinking, and permanent readiness for continuous learning. It has been indicated that teachers should not try to teach all sixteen habits at once during course topics using the flipped classroom. Instead, they can select the habits and introduce these based on their assessment of students' needs, the content and context of the lesson, and other school priorities (Costa and Calic, 2003; Nofal, 2008; Al-Shami, 2010, Ayasrah, 2012; Al-Harishi, 2014; Al-Daoudia, 2014; Lubna, 2018). First, the apparent validity of the mind-habits scale was determined. The scale was presented in its initial form consisting of (38) phrases representing the six mind-habits to some experts (8) and specialists in curricula and teaching methods. After implementing the experts' opinions, the scale was modified in its final form consisting of (36) phrases. Moreover, the validity of the mind-habits scale's internal consistency was verified by calculating the correlation coefficients between each item's degree, the total degree of the dimension to which it belongs, and the total score of the scale as shown in Tables (2 and 3).

Table 2. *Correlation coefficients between each item's score and the total degree of the dimension to which it belongs.*

First dimension	Item no.	Correlation coefficient	Second dimension	Item no.	Correlation coefficient	Third dimension	Item no.	Correlation coefficient
Perseverance	1	0.743**	Thinking flexibly	7	0.866**	Thinking about thinking	13	0.641**
	2	0.784**		8	0.696**		14	0.792**
	3	0.721**		9	0.596**		15	0.506*

	4	0.754**		10	0582**		16	0.639**
	5	0.741**		11	0.879**		17	0.759**
	6	0.769**		12	0.859**		18	0.609**
Fourth dimension	**Item no.**	**Correlation coefficient**	**Fifth dimension**	**Item no.**	**Correlation coefficient**	**Sixth dimension**	**Item no.**	**Correlation coefficient**
Applying previous knowledge to new situations	19	0.671**	Reciprocal thinking	25	0.904**	Permanent readiness for continuous learning	31	0.760**
	20	0.671**		26	0.835**		32	0.705**
	21	0.686**		27	0.872**		33	0.709**
	22	0.639**		28	0.840**		34	0.593**
	23	0.759**		29	0.831**		35	0.642**
	24	0.609**		30	0.823**		36	0.858**

Note: ** Significance level 0.01 and * Significance level 0.05

Table 3. *The correlation coefficients between each dimension's degree and the total score of the scale.*

Scale dimensions	**Correlation coefficients**
Perseverance	0.530*
Thinking flexibly	0.743**
Thinking about thinking	0.802**
Applying previous knowledge to new situations	0.461*
Reciprocal thinking	0.643**
Permanent readiness for continuous learning	0.449*

Note: ** Significance level 0.01 and * Significance level 0.05

The results show that the correlation of the degrees of dimensions of perseverance, the application of previous knowledge to new situations, and the permanent readiness for continuous learning which are related to the total score of the scale with the correlation coefficients of a function at the significance level of (0.05). The degrees of thinking flexibility, thinking in thinking, and reciprocal thinking are related to the overall degree of the scale with the correlation coefficients function when significance level (0.01). It confirms that the scale has a high degree of validity of internal consistency. To verify the mind-habits scale's stability, the alpha-Cronbach coefficient was calculated for each scale's dimension. The results are as shown in Table (4).

Table 4. *The Alpha-Cronbach coefficient for the stability of the mind-habits scale.*

Scale dimensions	**Alpha-Cronbach coefficients of the scale**

Perseverance	0.838
Thinking flexibly	0.849
Thinking about thinking	0.786
Applying previous knowledge to new situations	0.752
Reciprocal thinking	0.920
Permanent readiness for continuous learning	0.784
Whole scale	0.889

It is clear from Table (4) that the stability coefficients of the mind-habits scale dimensions were ranged from (0.784 to 0.920). The overall reliability coefficient of the scale was (0.889). It confirms that the mind-habits scale has a high degree of stability**.** After consulting literature, the self-learning skills scale was designed to measure self-learning skills, set goals, plan for learning, organize and monitor learning, search for information, and self-evaluate (Kamel, 2003; Hasan, 2012; Al-Harbi, 2017; Zard, 2019). To determine the self-learning scale's apparent validity, it was presented in its initial form to 8 experts and specialists in curricula and teaching methods. It was consisted of (24) statements initially. They were requested to express an opinion about the appropriateness and clarity of the phrases and the extent to which each statement belongs to self-learning skills. After considering their observations, the scale in its final form has consisted of (25) phrases. Moreover, the validity of the self-learning skills scale's internal consistency was first verified using the correlation coefficients between the degree of each item and the total degree of the dimension to which it belongs, as shown in Table (5). Finally, it was achieved by the correlation coefficients between the degree of each dimension and the total score of the scale, as shown in Table (6).

Table 5. *Correlation coefficients between each item's score and the total degree of the dimension to which it belongs.*

Setting goals and planning for learning		**Organizing and monitoring learning**		**Searching for information**		**Self-evaluation**	
Item no.	Correlation coefficient	Item no.	Correlation coefficient	Item no.	Correlation coefficient	Item no.	Correlation coefficient
1	0.676**	7	0.880**	14	0.750**	19	0.515*
2	0.860**	8	0.706**	15	0.559*	20	0.759**
3	0.794**	9	0.611**	16	0.713*	21	0.730**
4	0.752**	10	0.517*	17	0.814*	22	0.648**
5	0.795**	11	0.850**	18	0.829*	23	0.796**
6	0.805**	12	0.855**			24	0.664**
		13	0.770**			25	0.602**

Note: ****** Significance level 0.01 and * Significance level 0.05

These results indicate that all the correlation coefficients between the scores of each dimension's items and the total degree of the dimension to which the function coefficients belong came with significance levels between (0.01 and 0.05).

Table 6. *Correlation coefficients between the degree of each dimension and the total score of the scale.*

Scale dimensions	**Correlation coefficients**
Setting goals and planning for learning	0.746**
Organizing and monitoring learning	0.829**

Searching for information	0.772**
Self-evaluation	0.512*

Note: ** Significance level 0.01 and * Significance level 0.05

These results show the correlation of a score of the self-evaluation with the overall score of the scale with the significant correlation coefficient is at a significance level (0.05). The rest of the dimensions are related to the significant correlation coefficients at the significance level (0.01). The results confirm that the scale has a large degree of validity of internal consistency. To verify the self-learning skills scale's stability, the Alpha-Cronbach coefficient was calculated for each dimension of the scale, and the results are as shown in Table (7).

Table 7. *The Alpha-Cronbach coefficient for the stability of the self-learning skills scale.*

Scale dimensions	**Alpha-Cronbach coefficient of the scale dimensions**
Setting goals and planning for learning	0.863
Organizing and monitoring learning	0.871
Searching for information	0.777
Self-evaluation	0.778
Whole scale	0.890

It is evident from Table (7) that the stability coefficients for the dimensions of the self-learning skills scale is ranged from (0.777 to 0.871), and the overall stability coefficient of the scale is (0.890). It indicates the high stability of the tool.

Experimental Processing Phase

The two research tools were applied to the control and the experimental study groups. The control group students were taught the traditional lecture using presentations. The experimental group students were introduced to the flipped class and its goal. According to the flipped classroom, they were taught the mechanism of its application and have required roles of students for the learning success. Both groups were provided with activities and training to activate their mind-habits. After 10 weeks, the two research tools (mind-habits scale and self-learning skills scale) were applied to both experimental and control groups.

The Pearson correlation coefficient method was used to verify the validity of the mind-habits scale's internal consistency and self-learning skills scale. It has also verified the validity of the third hypothesis. The relationship between the students' scores in the post-application of the mind-habits scale and the self-learning skills scale has been found. Moreover, the Alpha-Cronbach coefficient was applied for calculating the reliability coefficient for the two study tools. The t-test for two independent samples was performed to verify the significance of the differences between the scores of the two study groups in the post-application of the mind-habits scale and the self-learning skills scale. The size effect equation known as ETA-square (η^2) is shown in (Eq. 1) (Aasr, 2003, pg. 660).

$$\text{ETA Square}^2\ \eta = t^2 \therefore t^2 + \text{freedom degree} \quad \text{----------} \quad (1)$$

The first hypothesis claims that "There are statistically significant differences between the mean scores of the experimental group and the control group students in the post-application of the mind-habits scale in favor of the experimental group students." To verify this hypothesis's validity, the t-test was used for two independent groups to verify the significance of the differences between the mean scores of the experimental group and the control group students in the post-application of the mind-

habits scale. Table (8) shows the results of the t-test for each dimension of the mind-habits scale and the scale as a whole.

Table 8. *t-test results for the significance of the differences between the experimental and control groups in the mind-habits scale post-application.*

Scale dimensions	Groups	No.	Average	St. deviation	Freedom degree	t-test	Sig. value	Sig. level
Perseverance	Experimental	33	19.96	2.40	66	13.09	0.00	0.01
	Control	35	12.28	2.43				
Thinking flexibly	Experimental	33	21	2.80	66	9.26	0.00	0.01
	Control	35	15.8	1.62				
Thinking about thinking	Experimental	33	21.15	1.75	66	11.63	0.00	0.01
	Control	35	15.62	2.12				
Applying previous knowledge to new situations	Experimental	33	20.72	3.46	66	7.28	0.00	0.01
	Control	35	15	2.05				
Reciprocal thinking	Experimental	33	23.60	2.69	66	5.24	0.00	0.01
	Control	35	19.80	3.24				
Permanent readiness for continuous learning	Experimental	33	22.12	1.80	66	11.48	0.00	0.01
	Control	35	16.68	2.10				
Whole scale	Experimental	33	128.63	8.81	66	18.48	0.00	0.01
	Control	35	95.94	5.20				

The results indicate statistically significant differences at a level of 0.01 between the scores of the experimental and control groups in the post-application of the mind-habits scale, each dimension of the scale, and the total score of the scale. To identify the effect of using the flipped classroom in developing the mind-habits among the students at Prince Sattam bin Abdulaziz University, the ETA-square η^2 was calculated, and the results are as shown in Table (9).

Table 9. *The results of the ETA-square η^2 calculation for the effect size of using flipped classrooms in developing the mind-habits.*

Scale dimensions	T-test	ETA Square^2 η	Size effect
Perseverance	13.9	0.72	Big
Thinking flexibly	9.26	0.56	Big
Thinking about thinking	11.63	0.66	Big
Applying previous knowledge to new situations	7.28	0.44	Big
Reciprocal thinking	5.24	0.29	Big
Permanent readiness for continuous learning	11.48	0.66	Big
Whole scale	18.48	0.83	Big

It is evident from the results that using the flipped classroom has a significant impact on developing mind-habits among the experimental group students. It may be attributed to flipped classrooms that direct students to make the most of their mental capabilities through various lecture activities. It also allows them to view and repeat educational materials according to their abilities and time availability. It allows the student to be more active in the lectures. As in the traditional way, this transforms students from listeners to search for information in various educational sources. It enhances their different thinking skills, builds experiences, and improves communication skills among students. It also encourages flipped classrooms to invest the lecture time in activities that stimulate the students'

thinking, which encourages them to work together and encourages them to meditate. It deepens their understanding and increases their application of the information in the learning outside the classroom and investing the time of the lectures by asking questions and discussions. This result is consistent with studies that have proven the effectiveness of using modern strategies in developing mind-habits (Al-Harishi, 2014; Gad, 2017).

The second hypothesis claims that "There are statistically significant differences between the mean scores of the experimental group and the control group students in the post-application of the self-learning skills scale in favor of the experimental group students." To verify this hypothesis's validity, the t-test was used for two independent groups to verify the significance of the differences between the mean scores of the experimental group and the control group students in the post-application of the self-learning skills scale. The results are shown in Table (10).

Table 10. *The results of the t-test for the significance of the differences between the experimental and control groups in the post-application of the self-learning skills scale.*

Scale dimensions	Groups	No.	Average	St. deviation	Freedom degree	T-test	Sig. value	Sig. level
Setting goals and planning for learning	Experimental	33	19.33	2.67	66	7	0.00	0.01
	Control	35	14.14	2.25				
Organizing and monitoring learning	Experimental	33	3.41	21.75	66	4.14	0.00	0.01
	Control	35	2.40	18.17				
Searching for information	Experimental	33	3.66	17.10	66	6.18	0.00	0.01
	Control	35	2.36	12.42				
Self-evaluation	Experimental	33	4.42	20.90	66	7.14	0.00	0.01
	Control	35	2.96	14.34				
Whole scale	Experimental	33	9.46	79.9	66	9.91	0.00	0.01
	Control	35	5.06	60.68				

The results indicate statistically significant differences at a level of 0.01 between the experimental and control groups' scores in the post-application of the self-learning skills scale on each dimension of the scale and the scale's overall score. To identify the effect of using the flipped classroom in developing self-learning skills of students of Prince Sattam bin Abdulaziz University, the ETA square η^2 was calculated. The results are shown in Table (11).

Table 11. *The ETA square^2 η calculation results for the effect of using flipped classrooms on developing self-learning skills.*

Scale dimensions	t-test	ETA-square	Size effect
Setting goals and planning for learning	7	0.42	Big
Organizing and monitoring learning	4.14	0.20	Big
Searching for information	6.18	0.36	Big
Self-evaluation	7.14	0.43	Big
Whole scale	9.91	0.59	Big

It is evident from the results that flipped classrooms significantly impact developing the experimental group students' self-learning skills. It may be attributed to the fact that the flipped classroom use encourages students to self-learn by providing them with educational materials and video clips for the student to watch at the appropriate time for them and allows them to watch educational materials more than once. The flipped classroom also encourages students to take responsibility for their

learning through the activities provided. It requires the students to search for information in the available educational materials. The transformation of learning from teacher-centered learning to learner-centered learning encourages the development of self-learning skills. This result is consistent with studies that have indicated the effectiveness of using some educational technology strategies to develop self-learning skills (Hassan, 2012; Abdul-Salam, 2013; Muhammad, 2017).

The third hypothesis claims that "There is a positive correlation between the scores of the experimental group students on the mind-habits scale and their scores on the self-learning skills scale." To verify the validity, the Pearson correlation coefficient was calculated between the experimental group students' scores in the post-application of both the habits of mind scale and the self-learning skills scale. The correlation coefficient value was (0.601), a function value at a significance level (0.01). It means that there is a statistically significant correlation, at a significance level of 0.01, between students' scores on the mind-habits scale and their scores on the self-learning skills scale. This result is consistent with the study results, showing the relationship between developing mind-habits and self-organizing learning skills (Al Farhan, 2015; Khalil, 2020).

CONCLUSIONS

It is concluded from the results of this present research that the flipped classroom promotes the students to advance the mental capabilities through various activities within the lecture. It transforms students from listeners to active participants to search for information in various educational sources. It enhances their different thinking skills, which develop the mind-habits in the students. Moreover, it encourages students to self-learning by providing them with educational materials and video clips. It motivates them to take responsibility for their learning through the activities provided, which has also augmented their self-learning skills. Besides, it is found that there exists a correlation between students' scores on the mind-habits scale and their scores on the self-learning skills scale.

Considering the research results, it is recommended to hold training courses for faculty members in Saudi universities to familiarize them with the importance of flipped classrooms with their students and describe the methods to apply them. There is a dire need for faculty members to pay attention to their students' minds-habits and develop through a shift from traditional teacher-centered learning to student-centered learning. It is essential to realize the students' responsibility for their learning and encourage them to search for information in multiple learning sources. Then, they do not rely on the primary reference for the course only. It is necessary to conduct studies to measure the faculty members' attitudes towards flipped classrooms in university education. Future studies should be conducted in other courses to reveal the flipped classrooms' effects on the development of the mind-habits.

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