The Effect of E-learning Social Strategy (ELSS) in Developing Science Teaching Achievement, Science Communication and Attitudes About Learning Based on Social Media

أثر استراتيجية التعلم الاجتماعي الإلكتروني في تنمية التحصيل في تدريس العلوم والتواصل العلمي والاتجاهات نحو التعلم القائم على وسائط التواصل الاجتماعي

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ملخص: هدف البحث الحالي إلى تقصي أثر استراتيجية التعلم الاجتماعي الإلكتروني في تنمية التحصيل العلمي في مساق تدريس العلوم لدى طلاب كلية التربية وتنمية مهارة التواصل العلمي وتنمية اتجاهاتهم الإيجابية نحو التعلم القائم على وسائط التواصل الاجتماعي. والكشف عن الفروق في المتغيرات الثلاث تبعاً لمتغير المعدل التراكمي، والكشف عن العلاقة بين المتغيرات التابعة الثلاث.

واتبع المنهج شبه التجريبي ذو المجموعة الواحدة مع التطبيق القبلي والبعدي، وصمم ثلاث أدوات بحثية. وتوصل إلى عدة نتائج من أهمها: وجود أثر لاستراتيجية التعلم الاجتماعي الإلكتروني في تنمية التحصيل العلمي في تدريس العلوم، وتنمية التواصل العلمي لدى طلاب كلية التربية والاتجاهات نحو التعلم عبر وسائط التواصل الاجتماعي، ووجود فرق دال إحصائياً بين متوسطي درجات التحصيل العلمي بين مرتفعي ومنخفضي المعدل التراكمي لصالح ذوي المعدل التراكمي المرتفع، وعدم وجود فرق دال إحصائياً بين متوسطات درجات الاتجاهات والتواصل العلمي تعزى لمتغير المعدل التراكمي.

كلمات مفتاحية: *استراتيجية التعلم الاجتماعي الإلكتروني، تدريس العلوم، التواصل العلمي، الاتجاهات نحو وسائط التواصل الاجتماعي.* تطبيق الدمج.

The Effect of E-learning Social Strategy (ELSS) in Developing Science Teaching Achievement, Science Communication and Attitudes About Learning Based on Social Media

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Abstract: This research aimed to investigate the effect of (ELSS) in developing the achievement in the course of science teaching among the students of the faculty of education; as well as, developing the skill of science communication and their positive attitudes about learning upon social media. In addition it aimed to detect differences in the three variables according to the variable of the cumulative average; the disclosure of the relationship between the three dependent variables.

The researcher adopted the quasi-experimental method of one group with pre and post-application. The researcher designed three tools.

The results showed the effect (ELSS) in developing science teaching achievement; and in developing the science communication and attitudes about learning based on social media among the students of the faculty of education.

There were significant differences between means of achievement high and low cumulative average in favor of a high cumulative average. There is no a statistically significant differences between means scores related to attitudes and science communication.

Key Words: e-learning -social strategy (ELSS), science teaching, science communication, attitudes about social media.

Introduction:

In the present age, it is no longer acceptable to teach without considering the role of the learners and involving them into different procedures of teaching and learning; and attention to the different fields such as mental, emotional, skillful, and social.

The millennial generations of students are digital natives coming to higher education with extensive experience in social media [1]. Current electronic media provides large amounts of unrelated information that are seeming of equal importance. Electronic media helped users to get meaningful empathic intrapersonal and interpersonal communication [2].

Depending on the importance of social media, and the enormous data it includes what is important and unimportant. This calls for the need to direct learners for useful information. As well as, making of private pages and management of educational groups, through social media to make advantage of their potential; and the investment of students' time in

achieving scientific achievement, scientific thinking and scientific interests.

Therefore, they can be intelligently integrated into methodological activities and non-curricular activities, taking into account the criteria of interest, harmony, attractiveness, specialization and to be cited.

In learning strategies, the learners adopt different self-regulated learning strategies resulting in different e-learning outcomes; and integrate self-regulated learning strategy support with e-learning system design and development [3].

The use of social media offers a forum for a teacher that aligns with scientific thinking around learning and development [4].

Social media enhances student learning, satisfaction, and sense of connectedness [5]. Since some of education roles are preparing students to be college members and ready for the career, the use of social media as a component of schooling should be explored [6].

Using of social media as a learning tool, a rationale for why open forms of social media, can be appropriate for students and can be investigated. The ways in which one study integrates social media with his teaching is then described before student's outcomes and then explained. It is necessary to involve those considering integrating social media tools into their pedagogy [7].

The adoption of a strategy based on a combination of social learning and e-learning in science teaching is necessary.

Increasing, the benefits of each type and reducing their risks. It works to achieve the learning goals with maximum energy and capacity.

Megele [8] study redesign module to enhance students' engagement and learning through embedding social media technologies into the academic curriculum as a learning and assessment strategy, this increased the students' engagement and the depth with breadth of their learning, while enhances its appreciation for both e-professionalism and personal learning networks.

Moll &Nielsen [9] study has been conducted a survey that examines science students' social media learning behaviors especially how students actually use social media for learning science. The Social Media and Science Learning can be used by both educators and researchers to understand how social media tools can be effective in a way that allows learning process to be enhanced and easily used.

Mercieca & Kelly [10] study described the support that early career teachers Australian teachers are permitted to log into private groups of social media as facebook. It suggests that further research needs to be conducted in order to show how private media groups could support the needs of early career teachers teachers.

Mercer-Mapstone & Kuchel [11] study confirmed that communication skills are one of the five nationally recognized learning outcomes for obtaining an Australian Bachelor of science degree. However, it was found that communication skills taught in Australian undergraduate science degrees are not developed sufficiently. Results indicate that 10 of the 12 core science communication skills used for evaluation were absent from more than 50% of assessment tasks and 77.14% of all taught assessment tasks which had less than 5 core communication skills explicitly. Prominent trends show that communication skills in tasks aimed at non-scientific audiences were taught more explicitly than in tasks aimed at scientific audiences.

Based on that, the skills of scientific communication need more special care by learners; and to attract their attention to science communication along with the non-science communication of social media.

Because current social technologies illuminate education, ethics, economy process, mobile electronic technologies have the potential to enhance further critical pedagogy and have great importance in teaching democratic important to construction teacher's ability [12].

Rapid growth in public communication of science and technology has led to many diverse training programs. A comprehensive set of learning goals contribute to science communication development such as the definition of science communication learning that addresses affective issues, content knowledge, methods, reflection, participation, and identity. No single program can achieve all learning goals [13]. Social media has transformed the way individuals and communities interact. This offers potentially limitless and flexible opportunities for communication and learning [14]. Teachers of science should be trained to communicate well using social media [15]. Scholars have suggested the potential of social media is needed for integrating formal and informal learning, although the majority of young people adopt the role of consumers rather than the role of full participants who are supposed to integrate together with social constructivism and connectivism through which to tease out the complexities of learning in various settings [16].

Research on the educational consequences of social media has led to divergent findings that are difficult to integrate and studies often examine specific courses. It is still unclear what types of social media should be used in classroom prevail on a broader scale and how teachers, if at all, can affect outcomes.

Results show that teachers apply social media for the purpose of information sharing with students outside the class and, more often, for teaching within the class. the teachers, who practice self-regulated learning in the classroom, are more inclined to use social media [17].

This encourages continued research on the effect of a teaching strategy that integrates e-learning with social learning; and investigates the effect of various aspects such as academic achievement, attitudes about the use of social media in learning and science communication.

Research questions:

The current research problem is determined by the following questions:

1- What is the effect of the (ELSS) in the development of academic achievement in science teaching among faculty of education students?

2- What is the effect of the (ELSS) in the development of science communication skills for science teaching process among faculty of education students?

3- What is the effect of the (ELSS) in the development of attitudes about learning process based on social media in science teaching among faculty of education students?

4- Is there a statistically significant difference in the post scores of achievement of science teaching due to the variable cumulative average (low or high)?

5- Is there a statistically significant difference in the post scores of attitudes about learning process based on social media due to the variable cumulative average (low or high)?

6- Is there a statistically significant difference in the post scores of science Communication due to the variable cumulative average (low or high)?

7- Is there a statistically correlation significant between the scores of academic achievement and the scores of attitudes about learning based on social media and scores of science communication?

The aims of research:

The current research aims to identify the effect of the (ELSS) in the

development of academic achievement concerning teaching science among the students of the faculty of education; and to develop both their the skill of science communication and positive attitudes about learning based on social media. As well, it aims to detection of differences in the three variables according to the variable a (high / low) in the cumulative average; and the correlation between academic achievement in science teaching and attitudes about learning based on social media and science communication.

Operational Definition of Terms:

The researcher includes some operational definition of the terms used in this research. They are as follows:

- **The effect:** The difference between the pre and post scores of research tools, caused by the use of (ELSS) as it is revealed by Wilcoxon signed ranks test.

- **E-learning- social strategy (ELSS):** A teaching strategy that integrates social learning including cooperation, interactions and human relationship; and to show how the student, as a social person, does neither learn only with peers nor in a rich cultural environment using examples and attitudes of teaching realism. Consequently, he can make use of social media such as Facebook in the teaching of the course of science teaching strategies.

- **Achievement in the science teaching:** The amount of scientific knowledge related to the basics of science teaching and which is acquired by students of the education faculty, whose major specialization is in science. It is expressed as the score obtained by the student in the special test.

- **Attitudes about learning based on social media:** Student's senses and positive beliefs about learning science teaching process by joining others as an active members of a closed group of science teaching via Facebook; and offering topics and issues for discussion, immediate and deferred feedback as expressed in the score obtained by the student based on the scale of attitudes.

- **Science communication:** process of summarize the scientific subjects clearly, transmitting ideas to colleagues easily, and the expression of scientific content in various forms. As well, the right of scientific reports, and exchange information and comments with others and consequently providing opinions and recommendations about the subject of learning, and discussing the topics of science teaching. It is also meant for the formation of dialogue based on scientific persuasion that is measured by a special questionnaire that meets to its own student requirements.

Research limitation:

The present research is limited to a sample of female students of the education faculty in the course of the academic year 2016/2017. It is limited to academic achievement in the course of science teaching strategies1, attitudes about learning based on facebook, and one science process of communication.

Method of research: The researcher used the quasi-experimental, one-group approach with the pre- test and post-test because it is appropriate to the nature of the research, its problem, to answer its questions and achieve its aims.

Sample of research: It consisted of (14) female students who registered for the course of strategies for science teaching1 in a deliberate manner, from the students who have e-mail and Facebook accounts and have the ability to join the closed group of science teaching.

Tools of research:

1- Science Achievement Test (SAT) which consists of three main questions varied between the objective and essay; each question contains sub-questions, the total score is (60), and verified the validity of the content, and reliability (0.79).

2- A scale of attitudes about learning based on social media. It consisted of (20)

positive and (10) negative phrases, all of which are divided into six dimensions; each of the six included enjoying learning through facebook; the importance of facebook to learn; the science articles through facebook; learning to teach through facebook; public overview to facebook and the nature of facebook using the scale of strongly agree, agree, do not know, disagree, strongly disagree, The minimum score is (30) and the maximum score is (150). Their validity was verified using internal consistency by calculating the correlation coefficients between the total scores of each dimension and the total sum, were 0.95 – 0.92- 0.92- 0.92- 075- 0.96 and reliability Spearman-Brown Coefficient is (0.97).

3- The science communication questionnaire was composed of (15) positive phrases: very highly 5, highly 4, intermediate 3, small 2, very small 1, the minimum score is (15). The maximum score is (75). Pearson correlation was confirmed by the total of the two dimensions and the total number of scores reaching the first dimension (0.91) and the second dimension (0.96). Reliability by Cronbach's Alpha (0.916).

The results:

To answer first question, which states: What is the effect of the (ELSS) in the development of academic achievement in science teaching among faculty of education students?

The researcher computed Wilksson's test of two dependent samples of the data between pre-test and post-test to test the achievement of science teaching as shown in Table (2):

Table (1): Means and standard deviations of pre and post test scores of achievement

	N	Mean	Std. Deviation
Post achievement test	14	45.79	8.79
Pre achievement test	14	40.36	8.17

Table (2): Wilcoxon Signed Ranks Test between pre and post test scores of achievement in science teaching

Achievement		N	Mean Rank	Sum of Ranks
post – pre	Negative Ranks	2	7.75	15.5
	Positive Ranks	12	7.46	89.5
	Total	14		
	Z		2.33	
	Sig. (2-tailed)		.020	

Table (2) shows that the difference between the ranks of scores of pre-test and post-test and of the achievement test applied in science teaching is that the value of Z (2.33) is statistically significant at (0.02).

This indicates that there is a statistically significant difference between the scores of pre-test and post-test of the science teaching achievement in favor of the post-test, which has an average score of (45.79), and an increase of (5.43) score from pre application.

Due to the organized scientific knowledge provided by the (ELSS), this result perhaps has generated positive interaction with students, stimulated their abilities and helped them organize these knowledge; thereby increasing their awareness of science value in the basics of science teaching. The advantages of e-learning are based on the individualization of learning and the freedom of the student to learn according to the time that suits him/her and fits his/her circumstances.

Together with the advantages of social learning as a human being, a social living

does neither grow nor learn correctly only in a rich social and cultural environment, Depending on teaching science fundamental (as an important profession in society with a scientific dimension), human and technological dimension are keen to employ modern technologies to achieve the best results.

Cromity [18] study confirmed the impact of social media as undeniable for educational use.

This result is consistent with the result of the study Ho etal [19] Which pointed out the role of social media in cultivating public science knowledge at a sample of 901 Singaporeans. And are with Leung Wong &Yung [20] study has shown that science can be developed and understood in the media of individuals in non-scientific disciplines.

To answer second question, which states: What is the effect of the (ELSS) in the development of science communication skills for science teaching process among faculty of education students?

The researcher computed Wilksson's test of two dependent samples of the data between pre and post-application to scale of science communication questionnaire, as shown in Table (4):

Table (3): Means and standard deviations of pre - and post - application scores of science communication

	N	Mean	Std. Deviation
Post communication	14	55.57	9.64
Pre communication	14	32.23	5.59

Table (4): Wilcoxon Signed Ranks Test between pre - and post - application scores of science communication

Attitudes		N	Mean Rank	Sum of Ranks
post – pre	Negative Ranks	0	0	0
	Positive Ranks	14	7.5	105
	Total	14		
	Z	3.3		
	Sig. (2-tailed)	0.001		

Table (4) shows that the difference between the ranks of scores of pre and post application of the science communication is that the value of Z (3.3) is statistically significant at (0.001).

This indicates that there is a statistically significant difference between the scores of pre and post application of the questionnaire of the science communication in favor of the post application, which has an average score of (55.57), and an increase of (23.34) score from pre application.

In general, this may be due to the nature of social media based on communication in general, interaction between people and participation in particular and public events.

And enriching scientific reports and how to the method of planning science teaching, the transfer of scientific ideas among the students who are members of the facebook group. The study reflects the student's view; their scientific responses, their positive interaction among them. As well as, it provides a feedback both individually and collectively and both synchronous and asynchronous.

This result differs from the outcome of Persson &Svenningsson [25] study

showed that the use of social media as communication strategy at Linköping University was not significant. It also differs from the outcome of Johnson et al [26] study which indicated the social media messages in reducing the persuasive impact of those messages.

To answer third question, which states: What is the effect of the (ELSS) in the development of attitudes about learning process based on social media in science teaching among faculty of education students?

The researcher computed Wilksson's test of two dependent samples of the data between pre- post-application to a scale of attitudes about learning based on social media, as shown in Table (6):

Table (5): Means and standard deviations of pre - and post - application scores of attitudes about learning upon social media

	N	Mean	Std. Deviation
Post attitudes	14	106.5	18.64
Pre attitudes	14	97.98	17.15

Table (6): Wilcoxon Signed Ranks Test between pre - and post - scores of attitudes about learning upon social media

Attitudes		N	Mean Rank	Sum of Ranks
post – pre	Negative Ranks	0	0	0
	Positive Ranks	14	7.5	105
	Total	14		
	Z	3.3		
	Sig. (2-tailed)	0.001		

Table (6) shows that the difference between the ranks of scores of pre and post attitudes scale is that the value of Z (3.3) is statistically significant at (0.001).

This indicates that there is a statistically significant difference between the scores of pre and post application of the scale of attitudes in favor of the post application, which has an average score of (106.5), and an increase of (8.52) score from pre application.

This finding may be attributed to the fact that social e-learning provides the student's mental enjoyment along with learning process; preoccupation and suitability; allows and provides interactive activities that interest them; increases their responses and thus their participation. Facebook also increases students' motivation to follow up published topics and their commentaries to adapt their circumstances, situations and times; thus increasing the positive attitudes about learning based on the social media of the students of the education faculty.

This was observed by the researcher at the beginning of the experiment. Some students were conscious about the use of social media depending on their potentiality of using facebook to teach science; but during the experiment the researcher began to observe the disappearance of the astonishment; and the actual integration in activities, participations, comments and lyrics.

This result is consistent with the result of Aalderen -Smeets et al [21] study which improves positively affected primary teachers' attitudes about teaching science. As Al-Rahmi et al [22] study found Positive and significant relations were found among social media users, collaborative learning and the students' satisfaction in the context of learning the

Quran and Hadith. Erikson &Erikson [23] study found positive attitudes among nurses through the use of social media on the subject of nursing and care robots. And a study of Smeets et al [24] improved primary teachers' attitudes about teaching science. The inquiry project positively affected several elements of teachers' attitudes.

To answer fourth question, which states: Is there a statistically significant difference in the post scores of achievement of science teaching due to the variable cumulative average (low or high)? The researcher calculated the Mann Whitney's test for two independent samples between the low and high grades of the cumulative average in the achievement test, as shown in Table (8):

Table (7): Means and standard deviations of a achievement among High and Low scores in cumulative average

	N	Mean	Std. Deviation
High	6	52.3	3.3
Low	8	40.9	8.5

Table (8): Mann-Whitney test in achievement of science teaching between High - and Low scores in cumulative average

Cumulative average	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Sig.
High	6	11.00	66	3	39	2.71	.007
Low	8	4.88	39				
Total	14						

Table (8) shows that the difference between the ranks of students with high and the low cumulative average in the science teaching achievement test is that the value of Z (2.71) is statistically significant at (0.007). This indicates that there is a statistically significant difference in favor of the high cumulative average, with score of (52.3), which is (11.4) sore than the cumulative average among students of low cumulative average.

To answer the fifth question, which states: Is there a statistically significant difference in the post scores of attitudes about learning process based on social media due to the variable cumulative average (low or high)?

The researcher calculated the Mann Whitney's test for two independent samples between the low and high grades of the cumulative average in the attitude scale, as shown in Table (10):

Table (9): Means and standard deviations of a attitudes among High and Low scores in cumulative average.

	N	Mean	Std. Deviation
High	6	104.83	9.37
Low	8	107.75	5.75

Table (10): Mann-Whitney test in attitudes about learning based on social media between High - and Low scores in cumulative average

Cumulative average	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Sig.
High	6	7.66	46	23	59	0.129	0.9
Low	8	7.375	59				
Total	14						

Table (10) shows that the difference between the ranks of students of the high and the low cumulative average in the attitudes about learning based on social media scale is that the value of Z (0.13). This indicates that there is no a statistically significant difference between the high and low cumulative average.

To answer sixth question, which states: Is there a statistically significant difference in the post scores of science communication due to the variable cumulative average (low or high)?

The researcher calculated the Mann Whitney's test for two independent samples between the low and high grades of the cumulative average in the science communication questionnaire, as shown in Table (12):

Table (11): Means and standard deviations of a science communication among High and Low scores in cumulative average

	N	Mean	Std. Deviation
High	6	53	12
Low	8	57.5	7.7

Table (12): Mann-Whitney's test in science communication between High and Low scores in cumulative average

Cumulative average	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Wilcoxon W	Z	Sig.
High	6	6	36	15	36	1.16	0.25
Low	8	8.63	69				
Total	14						

Table (12) shows that the difference between the ranks of students with the high and low cumulative average in the science communication questionnaire is that the value of Z (1.16). This indicates that there is no a statistically significant difference between the high and the low cumulative average.

To answer seventh question, which states: Is there a statistically correlation significant between the scores of academic achievement and the scores of attitudes about learning based on social media tools and scores of science communication skills?

The researcher calculated the Pearson's correlation coefficient between the scores of post-application of the research tools in the three dependent variables. It is located between the achievement of science teaching and attitudes about learning based on social media (0.153), which is not statistically significant (0.6).

It is located between scientific achievement and science communication (0.1) and is not statistically significant (0.73).

And located between attitudes about learning based on social media and science communication (0.86) is not statistically significant (0.00).

This result is different from what was mentioned in Nguyen et all [27] study which show that attitude towards statistics is significantly related to achievement. As well, This result from Ramesh et al [28] study pointed out the role of attitude in improving prediction of teaching. Odom et

al [29] study which found that attitudes about science was positively associated with science achievement.

Conclusions:

The importance of this research reflects the importance of the subject that it deals with and (ELSS) as a teaching strategy and its impact on the three variables: the cognitive aspect, the emotional aspect and the thinking social aspect.

Besides, they may help the education faculty members to make use of an effective teaching strategy in teaching other undergraduate courses.

Consequently, it allows researchers to use appropriate research tools in other samples of researches and other university courses.

As a result, we conclude the following:

1– Applying e learning social strategy in the form of (mixing traditional teaching, active learning, modern learning and social media) is suitable for teaching the fundamentals of science teaching, especially in the knowledge field. Accordingly, this motivates other researchers experimenting the effect on the skill field.

2- Applying of e learning social strategy is useful in the development of the emotional field of science teaching represented in the attitudes about learning based on the social media of students in the education faculty.

3- Social media is not only useful for social relations and interaction between their members and surfers, but also it can be extended to include scientific communication as an important aspect of science teaching and as an important process of science.

4- The existence of a causal relationship between scores of academic achievement and grades of the cumulative average, where the average cumulative average increases in favor of students' academic achievement and vice versa; where the low cumulative average affects the low academic achievement in science teaching.

5- There is no causal relationship between the scores of attitudes about learning based on social media and the cumulative average of students. The high and low cumulative average have positive attitudes about learning based on social media, the first group does not exceed the second group.

6- The science communication can be developed among students of the low cumulative average as well as students with a high cumulative average.

7- Students considered that science communication was an extension of positive attitudes about learning based on social media, and there was no correlation between academic achievement, science communication and attitudes about learning based on social media.

Recommendations:

1- It is necessary for educational faculty members to apply (ELSS) and integrates them with traditional teaching in science teaching courses and other courses.

2– More attention should be drawn to the emotional field of students in the teaching of science and motivate them to develop their positive attitudes about learning through modern media along with academic achievement.

3 – Interest should be drawn in scientific communication as a social aspect and as a process of science among students in the teaching of science who should make an advantage of the potential of social media and the extent of its spread among students.

4- It is important to diversify the traditional and electronic activities directed at students in teaching science in a way that takes into account the abilities of students with a low cumulative average.

5 – Holding special training courses for faculty members regarding how to employ the (ELSS) in different lectures.

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