



The Effect of Using Educational Mapping as a Game in Teaching English Language on University Students' Self-Efficacy

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Abstract

Most Arab learners face many problems in learning the English language, and one of these problems is a lack of English language self-efficacy. The majority of EFL and ESL students have low motivation to learn English language and experience fear and high levels of anxiety when speaking, writing and summarizing. Thus, interventions directly aimed at providing a teaching method (educational mapping as a game) in teaching English language and testing its effect on students' self-efficacy. The purpose of the current study was to investigate the effect of using educational mapping as a game in teaching English language on university students' self-efficacy according to group and gender. The 36 students who made up the study's sample were split into the experimental and control groups at random ($n = 18$ in each group). The results of the study indicated that there were statistically significant differences in students' means responses of self-efficacy according to the group, and there were no statistically significant differences in students' means responses of self-efficacy according to gender. The results of the study showed that using educational mapping as a game in teaching English language positively influenced university students' self-efficacy. These findings support using educational mapping as a game in teaching university students English language since it could increase their self-efficacy.

Keywords: Educational Mapping, English Language Self-Efficacy, University Students.

Introduction

Graphic organizers are graphic illustrators that aid readers in organizing and arranging their thoughts and ideas (Manoli and Papadopoulou, 2012). Douglas et al. (2011) found that graphic organizers demonstrate connections among various concepts to help learners comprehend and grasp what they read. Graphic organizers are known as visual illustrations that are built by using arrows, boxes, lines and shapes in a specific way to portray relationships between concepts and ideas. Hibbard and Wanger (2003) found that a graphic organizer is a visual illustration that demonstrates a relationship directed by an organized chain. The diagram is associated with many shapes connected with different lines. That is, the shape shows an event connected with a new shape that demonstrates a new event. One type of graphic organizers is mapping; using mapping is very beneficial because it assists students to be encouraged and motivated while learning; that is, it helps learners to apply and use words correctly.

Shanahan et al. (2006) concluded that using educational games offers effective guidelines for lecturers and educators that can target students' weaknesses. Hence, using games can improve students' academic levels and performance. Hadfield (2002) stated that games are types of activities dominated by rules, directed by a purpose, and strengthened with an element of enjoyment and fun. Several studies showed the positive effect of using games in teaching. For example, Harb (2007) found that the main aim of using games in teaching is creating enjoyment; using games can increase the social, cognitive and affective aspects of the student's character. In addition, games are considered useful aids of expression. That is, students can express their ideas, emotions, feeling and thoughts through games. However, most Arab learners face many problems in learning the English language, and one of these problems is a lack of English language self-efficacy (Almehmadi, 2013).

The researcher attempted to turn the educational mapping into a game and investigate its effect on students' self-efficacy. Many studies demonstrated the positive effect of using educational mapping and games in teaching. For instance, Kobari (2018) stated that using educational mapping as a game in teaching reading comprehension affected 11th-grade students' achievement and attitudes positively. In addition, Kobari et al. (2022) found that using games in teaching positively affected students' motivation and achievement. Furthermore, Kobari et al. (2023) indicated that using educational mapping in teaching the English language positively affected university students' motivation.

Self-Efficacy

Self-efficacy is a feeling of confidence that successfully lets one complete and organize a specific behavior. It affects the desire and enthusiasm, which one has towards a specific work or task. A high level of self-efficacy increases one's motivation to accomplish a task while a low level of self-efficacy depresses one to move away from finishing a particular mission (Bandura, 1986). Self-efficacy theory is based on social learning theory. The social learning theory is considered an important pillar of sustainable genuine resource management and the encouragement of desirable and required behavioral change (Muro & Jeffrey, 2008). The theory is founded on the principle that people learn when they interact with others in a specific social context. When people observe others' behavior, people try to make similar behavior. After noticing others' behavior, people imitate and assimilate that behavior, particularly if the observed behavior is rewarded or reinforced.

SLT is the most influential and effective theory in the fields of development and learning. The theory is seen as a bridge between cognitive learning theories and behaviorist learning theories since it encompasses motivation, memory and attention (Muro & Jeffrey, 2008). Bandura found that behaviors such as modeling and imitation are achieved when the person finds positive and desired outcomes. Many studies stated that learning can be achieved through modeling; that is, students can learn when they observe their teachers, parents or colleagues (Bandura et al., 2001). In Bandura's theory, self-efficacy is shown as a main influencer that affects one's expected results of behavior (Bandura, 2006b).

Educational Mapping

Al-Jarf (2011) indicated that mapping develops learning practices since it eases communication between learners and teachers. Furthermore, it improves recalling abilities, organizing and storing information, managing thoughts and developing students' competence. Hence, it increases learners' trust and confidence in their abilities. Goldberg (2004) indicated that mapping is a beneficial teaching and learning aid that fosters learners' engagement and involvement.

Mapping aids teachers to deal with individual differences properly (Budd, 2004; King, 2015). Mapping can develop learners' deep understanding and creativity; therefore, it affects their confidence and self-efficacy positively (Zampetakis et al., 2007). Padang and Guring (2014) stated that using mapping develops learners' abilities to share ideas and thoughts. It enables learners to respond to different kinds of questions since it gives them the trust and confidence they need. Jones et al. (2012) stated that using educational mapping in teaching positively influences students' enthusiasm. They also found that using mapping fosters and enriches the process of learners' engagement and involvement.

Yunus and Chien (2016) demonstrated that using mapping positively affects students' motivation and enthusiasm. In addition, Malekzadeh and Bayat (2015) indicated that using mapping helps learners to organize and arrange their thoughts easily. It assists learners to elaborate ideas and talk about the main topics of the lesson because it offers graphics and illustrations. It also positively affects students' attitudes and motivation. Furthermore, Pashie (2009) stated that using mapping directs and guides students while learning; hence, students will be aware of what they are doing. The study also revealed that students' confidence and trust in their abilities largely increased. Zhao (2003) found that mapping is a great and beneficial teaching aid that associates students' previous information with their current knowledge, creating a meaningful and interesting learning atmosphere. Besides, Padang and Guring (2014) stated that using mapping develops learners' abilities to share ideas and thoughts. It enables learners to respond to different kinds of questions since it gives them the trust and confidence they need.

However, this research was conducted to investigate the effect of using educational mapping as a game in teaching the English language on university students' self-efficacy. Besides, the current research aimed at answering the following two questions: 1) Are there statistically significant differences in students' means responses of English language self-efficacy due to group? 2) Are there statistically significant differences in students' means responses of English language self-efficacy due to gender?

Methodology

Participants

36 students made up the study's sample, which was randomly split into two groups: the experimental group (n = 18) and the control group (n = 18). A stratified random sampling method was used to choose the sample. In addition, the population of the study was master's degree students from Al-Quds Open University in Palestine; the number of master's degree students at Al-Quds Open University is about 800 students in the year 2022/2023. Participants were given a self-efficacy questionnaire (Wang, 2004) in English before and after the intervention. To address the study's questions, a two-group quasi-experimental design (training program) was employed. Before and after the intervention period, the performance of the two groups was assessed.

Study instruments

English Language Self-Efficacy Scale

The Questionnaire of English Self-Efficacy (QESE) was used by the researcher (Wang, 2004). Chinese, German, Korean, Vietnamese, and other languages and cultures have all had satisfactory results from the QESE's rigorous validity testing in English and other language variants (Truong & Wang, 2019; Wang, Kim, et al., 2013; Wang Schwab, et al., 2013). There are 32 items on the scale. Utilizing construct and content validity, the researcher validated the scale in the setting of Palestine; some items' phrasing was simplified after being examined by a group of psychology and English language experts. Moreover, the reliability coefficient of the scale was $\alpha = 0.983$.

Training Program

The texts from the pre-intermediate English language book, which is taught at various local universities in Palestine, were used to create the slides of the educational mapping. Additionally, the Erasmus program of the European Union co-founded the book

design project, and the mapping slides were created using information taken from the book. Moreover, the mapping slides are separated into four sections. Grammar is covered in the first section, writing in the second, and vocabulary and reading comprehension in the third. The training program was achieved by giving 8 lectures. The students were given a lecture every week, and every lecture lasted for 180 minutes. Members of the groups were in attendance for all of the researcher's lectures. While instructing the control group using conventional methods, the researcher used the educational mapping slide to instruct the experimental group. Table 1 shows the training program.

Table 1

Training-program lectures.

Lecture	Content	Lessons
1 st lecture (Units one and two)	Grammar	Sentences, Questions Transitive and intransitive verbs Regular and irregular verbs Present Simple and Wh-Questions
2 nd lecture (Units three and four)	Grammar	Past Simple Passive voice (Present simple and past simple) Imperative
3 rd lecture (Units five and six)	Grammar	Present progressive, present perfect Comparative adjectives Superlative adjectives
4 th lecture (Units one and two)	Reading comprehension and vocabulary	Greetings from around the world, Netiquette Food and Health, what is in your food? Cuisines and Countries, get healthy
5 th lecture (Units three and four)	Reading comprehension and vocabulary	Wonders of the world, Jerusalem and Bethlehem full day tour, biomes Fashion ...are you interested? Palestinian Traditional customs: The story of place and memory
6 th lecture (Units five and six)	Reading comprehension and vocabulary	Learning and Technology A new Era of Entertainment Technology Palestine got home E-sports
7 th lecture (Units one, two and three)	Writing Topics	Capitalization Commas Application and assessment
8 th lecture (Units four, five and six)	Writing Topics	Giving Reasons (Because and so) Contrasting (But) Application and assessment

Study procedures

After selecting the population of the study (Master's degree students from Al-Quds Open University), in a pilot study, the researcher tested the scale with 23 students. When there were 36 participants, they were separated at random into two groups based on the lecture's start time. Some students opted to attend the lecture on Sunday at 4 p.m. while others chose Thursday at 2 p.m. As opposed to teaching the control group using conventional teaching methods, the researcher taught the experimental group using educational mapping. During the summer session, instruction for the two groups continued for about two months. The intervention period lasted from July 1, 2022, until September 1, 2022. The two groups' performance was assessed before and after the intervention.

Data analysis

In the pre-and post-tests, the means and standard deviation of the controlled and experimental groups were utilized to examine the impact of educational mapping on university students' self-efficacy. The statistical data were examined using the programs ANCOVA, MANCOVA, and SPSS. Analysis of covariance (ANCOVA) was used to test whether the study variables contributed to significant variations in students' self-efficacy means on pre-and post-tests.

Ethics

The Faculty of Graduate Studies at Al-Quds Open University granted the researcher permission to carry out this study. In addition, the participants' informed consent was obtained before collecting the necessary data.

Findings

To answer the research questions, many statistical procedures were done. These procedures are represented by the following tables.

Table (2)

Means and Standard Deviation for study variables on pre- and post-tests for self-efficacy

Dimension	Group	Pre-test			Post-test	
		No.	M	S.D	M	S.D
	Experimental	18	2.21	0.29	6.53	0.23
	Controlled	18	2.55	0.78	3.67	0.73
	Male	13	2.49	0.50	5.35	1.35
	female	23	2.30	0.67	4.89	1.64
	Total	36	2.38	0.60	5.12	1.53

Table (2) illustrates the means of self-efficacy scale for the experimental and control groups. That is, regarding the pre-test, the mean of the experimental group was 2.21 while the mean of the control group was 2.55. Moreover, regarding the post-test results, the mean of the experimental group was 6.53 while the mean of the control group was 3.67.

Table (3)

Analysis of covariance for a total score of self-efficacy according to group and gender

Dependent variable	Source	SS	DF	MS	F	P
Self-efficacy	Pre-test	0.014	1	0.014	0.05	.824
	Group	4.063	1	4.063	14.72	.001**
	Gender	0.0008	1	0.0008	0	.986
	Group * Gender	0.158	1	0.158	0.572	.456
	Error	8.01	29	8.01	.276	
	Total	12.25	33	12.25		

** $P \leq 0.01$

Table (3) demonstrates that there were no significant differences in the pre-test between the two groups ($P = 0.824$). Moreover, regarding the post-test, there was a significant difference according to group ($P = .001^{**}$), and there were no significant differences according to gender ($P = 0.986$). In addition, Figure 1 represents the clear differences in self-efficacy means in the pre and post-tests between the control and experimental groups.

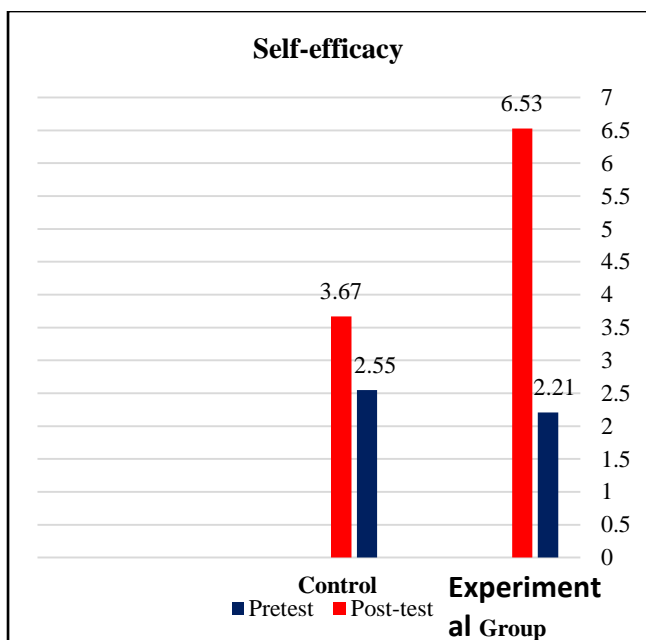


Figure (1) The Differences in Means of Self-efficacy in the Pre-and Post-tests between the Control and Experimental Groups

This figure indicates that the mean of the experimental group in the pre-test was 2.21 while the mean of control group was 2.55. However, the figure also demonstrates that the mean of the experimental group in the post-test was 6.53 while the mean of the control group was 3.67. That is, using educational mapping as a game positively affected the self-efficacy of the experimental group.

Discussion

The results of the pre-test demonstrated that there were no statistically significant differences between the control and experimental groups in self-efficacy. However, the results of the post-test indicated that there was a statistically significant difference between the control and experimental groups. The significant difference in self-efficacy in the post-test demonstrated the positive and significant effect of using this method in teaching English on students' self-efficacy. It also showed that the experimental group outperformed the controlled group; hence, using the new method in teaching English was more beneficial than using other traditional and common teaching methods.

The results of the study also confirmed the results of the following studies. First, Al-Jarf (2011) indicated that mapping develops learning practices since it eases communication between learners and teachers. Besides, it improves recalling abilities, organizing and storing information, managing thoughts and developing students' competence. Hence, it increases learners' trust and confidence in their abilities. Mapping can develop learners' deep understanding and creativity; therefore, it affects their confidence and self-efficacy positively (Zampetakis et al., 2007).

Using the new method in teaching English was introduced as a game and new method. Therefore, it attracted their attention and helped them to concentrate. Then, they felt they could understand the given topics since the structure of mapping could simplify the content by showing the basic and minor ideas. When the students felt they understood the given topics, it helped them not to feel nervous, reduced their fears of using the language and created an enjoyable learning atmosphere. That is, the researcher thinks that when the method assisted the learners to know the minor and basic

ideas, it assisted them to grasp the content of the lecture; thus, it broke the fear of learning a foreign language and created an interactive and enjoyable learning atmosphere. Hence, it increased their self-efficacy and confidence in their abilities since they noticed they could play their roles easily.

The results of the current study also confirmed the following studies. First, Padang and Guring (2014) stated that using mapping develops learners' abilities to share ideas and thoughts. It enables learners to respond to different kinds of questions since it gives them the trust and confidence they need. Second, Pashie (2009) stated that using mapping directs and guides students while learning; hence, students will be aware of what they are doing. The study also revealed that students' confidence and trust in their abilities largely increased. Third, Kobari et al. (2022) found that using games in teaching positively affected students' motivation. Fourth, Kobari et al. (2023) indicated that using educational mapping in teaching the English language positively affected university students' motivation. Fifth, Goldberg (2004) indicated that mapping is a beneficial teaching and learning aid that fosters learners' engagement and involvement.

The researcher thinks the method improved students' skills and abilities in different ways. First, it assisted them to acquire different terms and expressions. Second, it guided them to find the main and major ideas. Third, it helped them to recall and memorize words. Fourth, it gave them the chance to participate and think. Fifth, it developed their skills to form complete sentences. Sixth, it helped them to take notes and summarize the lesson. Seventh, it improved their English language skills. Besides, it activated them to communicate in English. Furthermore, it helped them to speak the English language easily, and it activated their vocabulary. Moreover, it affected their feelings; that is, it helped them to feel encouraged, enthusiastic, motivated and not nervous. Hence, it positively affected their confidence and self-efficacy. When the student finds him/herself capable of doing a task, s/he will gain trust in his/ her abilities. Thus, this will develop the way that the student perceives his/her abilities and skills. When the learning atmosphere is characterized by positive feelings, the student will be attracted to show his/ her abilities and skills. Hence, the students' self-efficacy was improved.

Besides, the results of the study came in line with various studies. For instance, Jones et al. (2012) stated that using educational mapping in teaching positively influences students' enthusiasm. They also found that using mapping fosters and enriches the process of learners' engagement and involvement. Furthermore, Yunus and Chien (2016) demonstrated that using mapping positively affects students' motivation and enthusiasm. In addition, Malekzadeh and Bayat (2015) indicated that using mapping helps learners to organize and arrange their thoughts easily. It assists learners to elaborate ideas and talk about the main topics of the lesson because it offers graphics and illustrations. It also positively affects students' attitudes and motivation. Moreover, Kobari (2018) stated that using educational mapping as a game in teaching reading comprehension affected 11th-grade students' attitudes positively.

However, based on the results of the second question, the gender variable had no impact on self-efficacy. That is, there were no statistically significant gender differences between the control and experimental groups. Hence, the researcher thinks that there are numerous explanations for the gender-specific findings of the

current study. First, both females and males loved the method, and it boosted their self-efficacy roughly in the same way. This means that utilizing mapping as a game to teach the English language had a similar effect on both genders. Second, both males and females who were taught by using this method became more confident since they responded quickly and were generally affected in the same way.

The results of this study elaborated that using the new method affected their self-efficacy positively. When their self-efficacy was affected positively, their desire towards learning the English language was affected positively. Besides, their efforts and persistence toward learning the language were increased.

Conclusion

The current research recommends lecturers, curriculum designers and professors to use educational mapping as a game in teaching English language to increase university students' self-efficacy. The researcher thinks that the idea of introducing educational mapping as a game could attract students' attention and concentration. Besides, it created an enjoyable and challenging learning atmosphere; the method helped the students to participate and play their roles easily; hence, it increased their confidence and self-efficacy. Therefore, the researcher suggests conducting future studies to test the effect of using educational mapping as a game in teaching other subjects.

Limitations of the study

The current study had different limitations. First, regarding the objective limitations, the study tested the effect of using educational mapping in teaching the English language. Second, regarding the time and place limitations, the research was conducted at Al-Quds Open University in the summer semester of the academic year 2022-2023. Third, regarding the procedural limitations, the researcher used the quasi-experimental design and the quantitative approach. Besides, MANCOVA, ANCOVA and SPSS were used to analyze the data.

References

- Al-Jarf, R. (2011). Teaching spelling skills with a mind-mapping software. *Asian EFL Journal Professional Teaching Articles*, 53, 4-16. [https://www.Teaching-Spelling-Skills-with-a-Mind-mapping-Software.pdf \(researchgate.net\)](https://www.Teaching-Spelling-Skills-with-a-Mind-mapping-Software.pdf (researchgate.net))
- Almehmadi, M. M. (2012). A contrastive rhetorical analysis of factual texts in English and Arabic. *Frontiers of Language and Teaching*, 3, 68-76. https://www.academia.edu/2365208/A_Contrastive_Rhetorical_Analysis_of_Factual_Texts_in_English_and_Arabic.
- Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, N.J.: Prentice-Hall.
- Bandura, A. (2006b). Toward a psychology of human agency. *Perspectives on Psychological Science*, 1(2), 164-180. <https://doi.org/10.1111/j.1745-6916.2006.00011.x>
- Bandura, A., Barbaranelli, C., Caprara, G. V., & Pastorelli, C. (2001). Self-efficacy beliefs as shapers of children's aspirations and career trajectories. *Child Development*, 72(1), 187-206. <https://doi.org/10.1111/1467-8624.00273>
- Budd, J. W. (2004). Mind maps as classroom exercises. *Journal of Economic Education*, 35(1), 35-46. <https://doi.org/10.3200/JECE.35.1.35-46>
- Douglas, K. H., Ayres, K. M., Langone, J., & Bramlett, V. B. (2011). The effectiveness of electronic text and pictorial graphic organizers to improve comprehension related to functional skills. *Journal of Special Education Technology*, 26(1), 43-56. <https://doi.org/10.1177/016264341102600105>
- Goldberg, C. (2004). Brain friendly techniques: Mind mapping. *School Library Media Activities Monthly*, 21(3), 22-24. <https://www.ERIC - EJ720682 - Brain Friendly Techniques: Mind Mapping, School Library Media Activities Monthly, 2004-Nov>
- Hadfield, J. (2002). *Elementary communication games (3rd end)*. Hong Kong: Thomas and Nelson Sons Ltd.
- Harb, A. (2007). *The Effectiveness of Educational Games on The Sixth Graders' Achievement in English Language in Gaza Southern Governorates*. [Unpublished Master's thesis], the Islamic University of Gaza, Gaza.
- Hibbard, K. M., & Wagner, E. A. (2003). *Assessing and Teaching Reading Comprehension and Writing K-3* (Vol.2). New York: Eye on Education.
- Jones, B. D., Ruff, C., Snyder, J. D., Petrich, B., & Koonce, C. (2012). The Effects of Mind Mapping Activities on Students' Motivation. *International Journal for the Scholarship of Teaching and Learning*, 6, 1-21. <http://dx.doi.org/10.20429/ijstl.2012.060105>.
- King, G. (2015). *Using Mind Maps for writing*. Nova Mind Software Pty Ltd. <https://www.novamind.com/mindmapping-software/writing/>.
- Kobari, S. (2018). *The Impact of Using Mapping as a Game in Teaching Reading Comprehension on 11th Grade Students' Achievement and Attitudes*. [Unpublished Master's thesis], Birzeit University.
- Kobari S.R., Mahamid, F. & Shaheen, M. (2023). The effect of using educational mapping as a game in teaching English language on university students' motivation. *Journal of Culture and Values in Education*, 6(2), 51-65. <https://doi.org/10.46303/jcve.2023.8>
- Kobari, S.R., Shayeb, S.J., Dawood, I.K. (2022). The Effect of Using Games in Teaching on Students' Achievement and Motivation. In: Burgos, D., Affouneh, S. (eds) *Radical Solutions in Palestinian Higher Education*. Lecture Notes in Educational Technology. Springer, Singapore. https://doi.org/10.1007/978-981-19-0101-0_3
- Malekzadeh, B. & Bayat, A. (2015). The effect of mind mapping strategy on comprehending implicit information in EFL reading texts. *International Journal Educational Investigation*, 2(3), 81-90. [https://www.Article Template \(ijeionline.com\)](https://www.Article Template (ijeionline.com))
- Manoli, P., & Papadopoulou, M. (2012). Graphic organizers as a reading strategy: Research findings and issues. *Creative Education*, 3(3), 348-356. <http://dx.doi.org/10.4236/ce.2012.33055>
- Muro, M. & Jeffrey, P. (2008). A critical review of the theory and application of social learning in participatory natural resource management processes. *Journal of environmental planning and management*, 51(3), 325-344. <https://doi.org/10.1080/09640560801977190>
- Padang, J. S. M., & Gurning, B. (2014). Improving Students' Achievement in Writing Descriptive Text through Mind Mapping Strategy. *Register Journal of English Language Teaching of FBS-Untimed*, 3, 1-11. <http://digilib.unimed.ac.id/id/eprint/15933>
- Pashaie, B. (2009). Teaching research for academic purposes. *The CATESOL Journal*, 21(1), 162-174. <https://www.ERIC ->

22. Shanahan, K., Hermans, C., & Haytko, D. (2006). Overcoming Apathy and Classroom Disconnect in Marketing Courses: Employing Karaoke Jeopardy as a Content Retention Tool. *Marketing Education Review*, 16 (1), 85-90. <https://doi.org/10.1080/10528008.2006.11488944>
23. Truong, T.N.N., & Wang, C. (2019). Understanding Vietnamese college students' self-efficacy beliefs in learning English as a foreign language. *System*, 84, 123–132. <https://doi.org/10.1016/j.system.2019.06.007>
24. Wang, C. (2004). *Self-regulated learning strategies and self-efficacy beliefs of children learning English as a second language*. [Unpublished doctoral dissertation], The Ohio State University.
25. Wang, C., Kim, D.-H., Bai, R., & Hu, J. (2014). Psychometric properties of a self- efficacy scale for English language learners in China. *System*, 44, 24–33. <https://doi.org/10.1016/j.system.2014.01.015>
26. Wang, C., Schwab, G., Fenn, P., & Chang, M. (2013). Self-efficacy and self-regulated learning strategies for English language learners: Comparison between Chinese and German college. *Journal of Educational and Developmental Psychology*, 3(1), 173-191. <http://dx.doi.org/10.5539/jedp.v3n1p173>
27. Yunus, M. and Chien, C. (2016) The Use of Mind Mapping Strategy in Malaysian University English Test (MUET) Writing. *Creative Education*, 7, 619-626. <https://doi.org/10.4236/ce.2016.74064>.
28. Zampetakis, L.A., Tsironis, L., & Moustakis, V. (2007). Creativity development in engineering education: The case of mind mapping. *Journal of Management Development*, 26(4), 370- 380. <https://doi.org/10.1108/02621710710740110>
29. Zhao, Y. (2003). The use of a constructivist-teaching model in environmental science at Beijing Normal University. *The China Papers*, 2, 78-84. https://www.The_use_of_a_constructivist-teaching_model_in_environment...