

**RESEARCH PAPER****The Role of Using the Surround Web to Improve STEM Practices among Secondary Students and Teachers****Shahinaz Abdelrahman Osman**

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Email: shahina@su.edu.saReceived: 13th May 2018, Revised: 9th June 2018, Accepted: 18th June 2018**ABSTRACT**

The study aim to investigate the role of using the Surround Web to improve STEM approach, that's while the secondary students were learning and integrating science, technology and mathematics through four class sessions after providing the students and the teacher with guidelines about how to integrate STEM components in their subject and the uses of the Surround Web. The research investigated the perspectives of teachers and students at (5th secondary school at Afif province in Saudi Arabia) using a cross section survey, 50 students and 10 teachers were chosen after completing the class sessions that using Surround Web and the STEM approach, who attended and executed the class sessions, the research findings indicate that- (i). There are significant differences between the perspectives of the students in the controlled group- which studied using the traditional way -and the experimental group which studied using the Surround Web about the role of the Surround Web on integrating STEM in class. (ii). There are no differences between the perspectives of teachers who used the Surround Web on integrating STEM in class.

Key words: Surround Web, STEM approach, Teachers and students perspectives, Secondary students

INTRODUCTION

Several studies have been conducted in using STEM in education (an evaluation of more than 400 National Science Foundation projects twelve years ago found significant empirical evidence of the educational benefits pedagogical reforms meant to foster student engagement in STEM courses) (Fairweather, 2010) but none of them- as known by the researcher- connect the using of the Surround Web to the Purposeful, structured use that develops user capabilities and the positive attitude towards the STEM systematic uses, despite of the attention and concern that STEM gains recently, the effectiveness of using STEM on students and teacher performance was checked many times connecting with several issues and techniques, this research tying and connecting between STEM using the Surround Web which is a (technology powered by a prototype 'IllumiRoom' device that scans the room for projectable services in one minute, and can then beam content on walls at 30 frames per second with up to 25 screens and up to a 1440x720 display, it was developed at Microsoft Research, uses technology originally intended for immersive gaming on its Xbox and PCs to cover up to 25 screens, using a series of projectors to move the content onto the walls and furniture of a room without the need to align the projectors with a room's flat surfaces) (consulting, 2014).

That's to improve STEM Practices for both teachers and students of secondary schools through an experience for mixing the digital world with reality however in education while every single aspect is improving and changing to digital and functional web based and integrated STEM education is an effort to combine science, technology and mathematics into one class that is based on connections between the subjects and real world problems.

RESEARCH PROBLEM

There is indirect evidence indicating that preservice and in-service science teachers need to expand their knowledge to implement STEM programs (Teo & Ke, 2014), from the researcher perspectives which had been promoted during teaching and supervising the pre service training for the educational college students the researcher noticed that the uses of STEM inside the class

room environment needs to be focused and improved to achieve the needed goals and pedagogical terms.

This research aim to study the benefits of using the Surround Web context to improve STEM in class integrating, through answering this research question:

RESEARCH QUESTIONS

1. What is the model of the Surround Web which used in class?
2. Are there differences between the perspectives of the students in the controlled group- which studied using the traditional way -and the experimental group which studied using the Surround Web about the role of the Surround Web on integrating STEM in class?
3. Are there differences between the perspectives of teachers who used the Surround Web on integrating STEM in class?

REVIEW OF THE RELEVANT LITERATURE

There are many problems related to the multiplicity of information resources in e-learning environments, the Frequent number of web pages within the web display, and the problems associated with the multitude of visual and audio stimuli and the hyperlinks in the scope of the main screen, and the difficulty of tracking the contents, Which requires the search for a new technique to reduce the presence of these stimuli in specific space, by searching for a technique to carry out number of outputs and distribute them on these stimuli scientist and teachers uses the Surround Web to solve these problems, "Surround Web provides three privacy properties: detection privacy, rendering privacy, and interaction privacy" (John Vilks, 2016)

The attention that STEM made since it was produced as a way of integrating subjects is very interesting and a lot of finding shows up during period of time "Research indicates that using an interdisciplinary or integrated curriculum provides opportunities for more relevant, less fragmented, and more stimulating experiences for learners"(Furner, 2007), and employing technology is an important part of the main goals of STEM and a part of the subjects that designed the whole aspect "based on the observation that STEM is often a term for science or mathematics, STEM should mean increased emphasis of technology in school programs" (Bybee, 2010).

Furthermore the students at secondary school which consist the research sample didn't use STEM earlier than these stage of their studying period which is a problem for them to emphasize and implement the concept and the practices at the right way "engaging with high-quality STEM experiences at a young age can have a lasting impact on learners, as it can set the stage for their later engagement and success in these fields. Such experiences can encourage and support children to articulate and represent their explorations, discoveries, thinking and understanding which in turn can help build critical early STEM knowledge and skills" (T.D., 27th November 2017).

The national economy is in need of more engineers and skilled workers in science, technology, and mathematics (STEM) fields who also possess competencies in critical-thinking, communication, and collaboration- also known as 21st century skills. In response to this need, educational organizations across the country are implementing innovative STEM education programs designed in part to increase student attitudes toward STEM subjects and careers (Faber, 2013).

METHODOLOGY

The research uses the experimental approach to determine the perspectives of teachers and students about the role of Surround Web to Improve STEM learning and integrating on class context situations.

A sample of 50 students- 25 of them were experimental group and 25 were controlled group- and 10 teacher were chosen intentionally to be involve in the experiment who are teaching science and math and also they attended a training course about (STEM), the teachers used the teacher's guide which prepared by the researcher to implement the class lesson sessions and to supervise students towards the appropriate uses of the Surround Web technique, the sample was chosen from the fifth secondary school in Afif province.

The model of the Surround Web which used in class consists of some techniques as following:

1. Using the room skeleton to render an immersive presentation

2. The high definition video presented on student(I- pads)
3. The documentary camera displayed geometric shapes
4. Using a science application (science 360) and a math application (Geoboard) to enhance integration of science and math and technology.
5. The merg cube used to demonstrate a hologram picture to the human body organs that takes a geometric shape.
6. The micro-bit to test the coding which simulates the movement forward and backward.

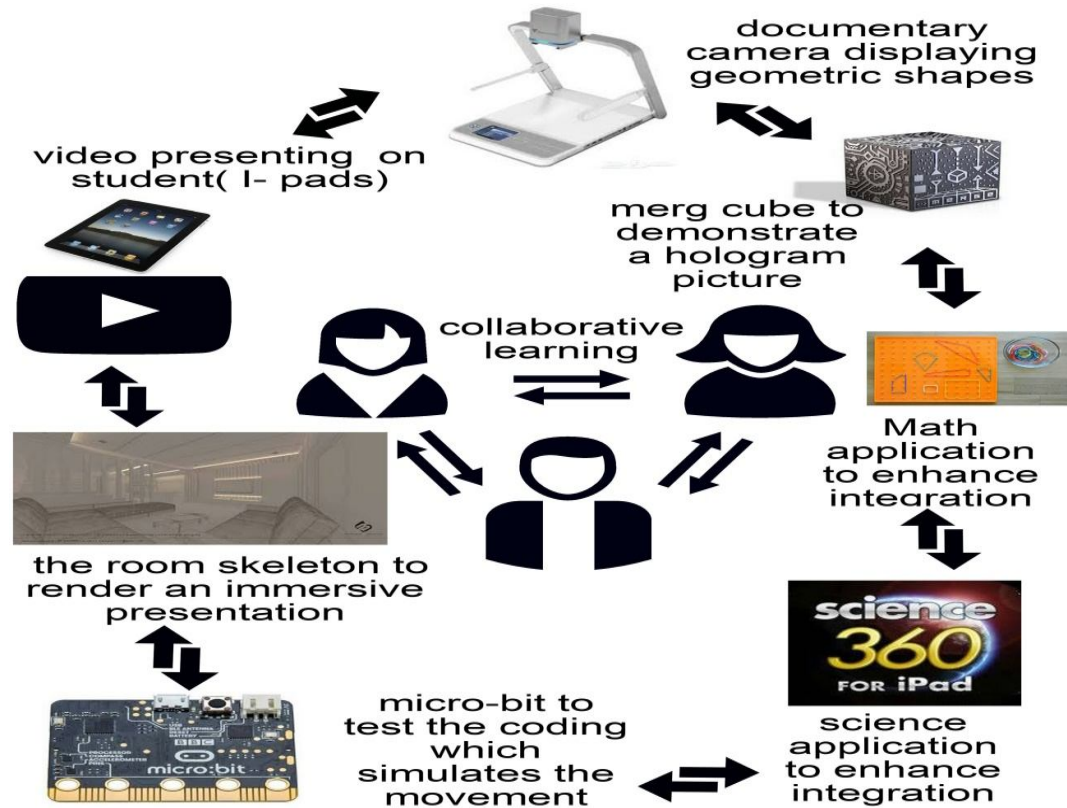


Fig. 1: Shows the model of the Surround Web which used in class

DATA ANALYSIS AND CONCLUSION

The researcher designed a questionnaire to collect and gather responses from the research sample and to detect the perspectives of them, its consist of (8) statements represents the role of the usage of the Surround Web on improve integrating STEM in class, furthermore the questionnaire reviewed by reviewer, two statements were added for each of the student's part as well as the teacher's part.

Table 1: Reliability Statistics

Cronbach's Alpha	Number of Items
0.932	11

The researcher calculate the reliability of the questionnaire before using it to collect data and the alpha Cronbach factor is very high as shown on the table above (0.932) which allow the researcher to use it at these research confidentially.

TEACHER'S QUESTIONNAIRE

The teacher's final skills and practices that were questionable are as following:

Do you think- from your point of view- that using the surround web has a role in integrating STEM on class session on term of:-

1. Enhance the teacher Instructional Strategies that Engage Students on learning
2. The supervision skills to use the problem-solving projects
3. Personalize teachers learning and self-development
4. Teacher skills to lead students through project-based learning
5. Teacher skills to lead students through experiential learning
6. Connect new concepts to previously learned knowledge
7. Create a Positive Attitudes toward using STEM on class
8. Enhance the STEM concept understanding among teachers
9. Coordination between teachers across disciplines and academic subjects
10. Provide personal standards of using STEM

STUDENT'S QUESTIONNAIRE

The student's final skills and practices that were questionable are as following:

Using the Surround Web helps me to:

1. Understand the concept of STEM in education
2. connect new concepts to previously learned knowledge
3. create a Positive Attitudes toward learning STEM
4. personalize my learning
5. Implementing project-based learning
6. Implementing experiential learning
7. tying ideas together across disciplines and academic subjects
8. encourage me to continue looking and making researches
9. discover my talents and work on it
10. motivate me towards learning and success.

Table 2: Correlation between the control group and the experimental group

Statements	Number of sample	Correlation	Sig.
Understand the concept of STEM	50	.893	.000
connect new concepts to previously	50	.929	.000
create a Positive Attitudes	50	.756	.000
personalize learning	50	.842	.000
Implementing project-based learning	50	.816	.000
Implementing experiential learning	50	.747	.000
tying ideas together	50	.846	.000
encourage me to continue looking and making researches	50	.847	.000
discover my talents	50	.768	.000
Motivate towards learning and success	50	.741	.000

As shown at the table above where Correlations indicates a predictive relationship that can be exploited in practice its appear based on the correlation results that there are significant correlation between the perspectives of the students at the controlled group vs. the perspectives of the students at experimental group which indicates that the using of the Surround Web make change on their believes.

As shown at the table-3 either results of (f) which indicates the (Levene's Test for Equality of Variances) or the results of t-test results between the perspectives of the controlled and the experimental group there are significant differences to the experimental group which indicates that the uses of the Surround Web affect the students perspectives toward STEM integration on their learning especially the implementing of experiential learning and the positive attitude that was created by the using of it these results are Proportionate with (John Vilk1, 2016)(We showed through surveys that the information revealed by Surround Web is acceptable. After a one-time setup procedure that scans a room for projectable surfaces in about a minute).

As shown at the table-4 the agreement factor on teachers perspectives after they used the surround web on their class practices it appears that there are an acceptable percentage of

agreement between them at the range between (90% to 60%) that's mean the using of surrounding web affects some of their practical and theoretical skills of STEM and the most agreement percentage was on (surround web enhance theirr Instructional Strategies that Engage Students on learning then comes the effect of surround web on their skills to lead students through project-based learning and experiential learning also to connect new concepts to previously learned knowledge and also surround web created a Positive Attitudes toward using STEM on class among them and enhance the STEM concept understanding also it motivated them to coordination across disciplines and academic subjects ,other effects comes with a less percentage but still acceptable (its effect on their supervision skills to use the problem-solving projects and Provide personal standards of using STEM and Personalize teachers learning and self-development), these results are quite appropriate with (Koehler, 2012) (results suggest that the faculty members do not share a common conceptualization of STEM. Their conception is most likely based on their academic discipline or how STEM impacts their daily lives. STEM faculty members were likely to have a neutral or positive conception where non-STEM faculty members often had negative feelings about STEM

Table 3: T-test between the control group and the experimental group

Statements	groups	N	Mean	St. deviation	F	t	d.f	Sig. (2-tailed)
Understand the concept of STEM	Experimental	25	4.3200	.62716	0.93	13.72	48	.000
	controlled	25	1.4800	.82260				
connect new concepts to previously	Experimental	25	4.6400	.63770	12.04	17.43	48	.000
	controlled	25	2.0000	.40825				
create a Positive Attitudes	Experimental	25	4.4800	.71414	4.04	8.005	48	.000
	controlled	25	2.3200	1.14455				
personalize learning	Experimental	25	4.5600	.76811	0.34	10.82	48	.000
	controlled	25	2.1600	.80000				
Implementing project-based learning	Experimental	25	4.4800	.71414	0.06	9.79	48	.000
	controlled	25	2.1200	.97125				
Implementing experiential learning	Experimental	25	4.5600	.76811	2.28	7.77	48	.000
	controlled	25	2.4000	1.15470				
tying ideas together	Experimental	25	4.4400	.71181	0.20	10.97	48	.000
	controlled	25	2.1200	.78102				
encourage me to continue looking and making researches	Experimental	25	4.5600	.71181	0.08	11.06	48	.000
	controlled	25	2.0000	.91287				
discover my talents	Experimental	25	4.4000	.70711	2.35	8.31	48	.000
	controlled	25	2.2800	1.06145				
Motivate towards learning and success	Experimental	25	4.6400	.63770	9.5	7.65	48	.000
	controlled	25	2.3200	1.37598				

Table 4: The results of agreement factor and variances between teacher's perspectives

Statement	mean	Std. deviation	variance	Agreement factor
Enhance the teacher Instructional Strategies that Engage Students on learning	4	.82	.667	%90
The supervision skills to use the problem-solving projects	3.8	1.14	1.289	%70
Personalize teachers learning and self-development	3.5	1.43	2.056	%60
Teacher skills to lead students through project-based learning	3.8	1.32	1.733	%80
Teacher skills to lead students through experiential learning	4.3	1.06	1.122	%80
Connect new concepts to previously learned knowledge	4.1	.99	.989	%80
Create a Positive Attitudes toward using STEM on class	4	1.41	2.000	%80
Enhance the STEM concept understanding among teachers	3.9	1.37	1.878	%80
Coordination between teachers across disciplines and academic subjects	3.9	1.1	1.211	%80
Provide personal standards of using STEM	3.9	1.2	1.433	%70

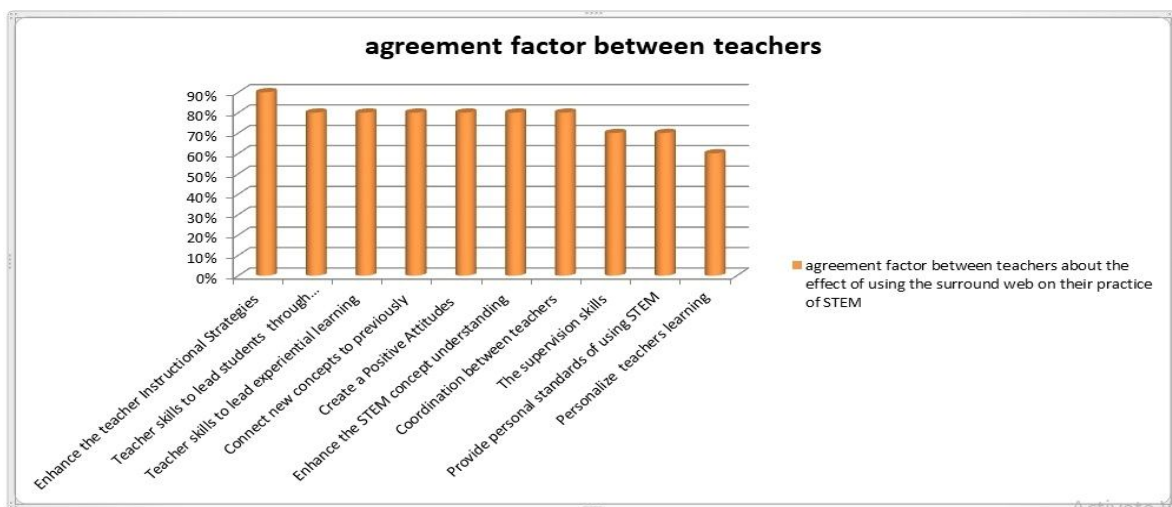


Fig. 2: Shows the agreement percentage on teacher prespectives

CONCLUSION

After the practical experience which was full of motivation stimuli and enjoyment the search finding was as following:

The using of the surround web effect on integrating STEM on class for both students and teacher which indicates that there are role for it such as enhance teachers instructional strategies that engage students on learning and the role of it on their skills to lead students through project-based learning and experiential learning also to connect new concepts to previously learned knowledge and created a positive attitudes toward using STEM on class among teachers as well as students and enhance the STEM concept understanding also it motivated them to coordination across disciplines and academic subjects ,on another hand its effect on teachers supervision skills to use the problem-solving projects and Provide personal standards of using STEM and Personalize teachers and students learning and self-development.

And from the students side the role of using the surround web that it helps them to understand the concept of STEM and to connect new concepts to previously learned knowledge in addition to its role on implementing project-based learning and experiential learning, also its very affective on tying ideas together across disciplines and academic subjects beside the motivation that it gives towards learning and success and discover talents among students and encouragement that it provides to continue looking and making researches.

REFERENCES

1. Bybee R.W. (2010): Advancing STEM Education: A 2020 Vision. Technology and engineering Teacher.
2. Faber M.U., Alana & Wiebe, Eric & Corn, Jeni & Townsend, Latricia & Collins, Tracy. (2013). Student Attitudes toward STEM: The Development of Upper Elementary School and Middle/High School Student Surveys. Paper presented at the American Society for Engineering Education, At Atlanta, GA. https://www.researchgate.net/publication/256081128_Student_Attitudes_toward_STEM_The_Development_of_Upper_Elementary_School_and_MiddleHigh_School_Student_Surveys
3. Fairweather J. (2010): Linking Evidence and Promising Practices in Science, Technology, Engineering, and Mathematics (STEM) Undergraduate Education. A Status Report Retrieved from The National Academies National Research Council Board of Science Education http://otl.wayne.edu/wider/linking_evidence-fairweather.pdf
4. Furner J. and Kumar D. (2007): The mathematics and science integration argument: a stand for teacher education. Eurasia Journal of Mathematics, Science & Technology, 3(3): 185-189.
5. John Vilk D.M., Eyal Ofek, Chris Rossbach, Benjamin Livshits, Alexander Moshchuk, Helen J. Wang and Ran Gal (2016): Least Privilege Rendering in a 3D Web Browser. University of Massachusetts Amherst Microsoft Research.

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