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Space Technology and its applications in the Egyptian Geography Curricula: SWOT Model and Strategy

Space Technology in Curricula

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Abstract: *The aim of this paper is to discuss the initiative carried out by the Egyptian National Authority for Remote Sensing and Space Sciences to strengthen and raise awareness with space technology and its applications, through its implementation using geospatial technology and remote sensing in schools. It reports the findings of a survey carried out by the research team and also suggests a future strategy to significantly involve space technology and its applications in the curricula. . SWOT model and strategy were developed for involving space technology and its applications in the curricula. This model and strategy are expected to contribute to the improvement of the education quality. It also determines the effectiveness of teaching geography in secondary schools based on utilizing geospatial technology in classrooms. A framework was developed to facilitate the interaction between teachers, students and content in classrooms that conforms to the Constructivists theory. The framework has been implemented by using online material and mobile application to help students to understand the content easily. Data was collected during academic years 2016-2018. The sample included 63 students and 97 teachers. The results indicated that there was statistically significant improvement in the scores of students after using the developed framework. The size of this effect was calculated where the effect was found to be medium. The findings show also the importance of designing curriculum and teaching strategies, activities, practicing guidelines, open sources programs*

Keywords—geospatial technology education; SWOT model; space technology education; interactive maps; educational framework.

1. Introduction

The study of space technology and its applications is one of the modern aspect related to the earth, and the introduction of this technology in pre-university curricula provides students with special skills in understanding the earth's environment (Keiper 1999; Wiegand 2001; Baker 2003). Few studies have been conducted on using space technology in schools. Abou-Gharib *et al.* (2009, 2011, 2013) developed educational programs for involving space and earth science in elementary and secondary schools. Pastiu (2013) studied the approach of education in the virtual space in Romanian universities. Sharaf Eldin *et al.* (2014a) developed learning environment to improve effectiveness of geo-informatics courses utilizing concept maps. Innovation activities were developed in the field of space education by participating in a project based on learning process where students work in groups to develop the conceptual design of a space mission (Rodrıguez *et al.* 2015). Giannakos *et al.* (2017) drew attention to the great potential and need for research in the area of developments in digital and physical spaces to support learning through making. Abou-Gharib *et al*. (2018) also proposed national criteria for the integration of space technology and earth sciences into the curricula of the preparatory education in Egypt. However, there is no study has been conducted on providing an approach to involve space technology in K-12 curricula.

Achieving sustainable development (UNESCO, 2014) requires changes in policies, in companies' production methods and in people's lifestyles (Perez-Rodríguez et al. 2017). In this regard, National Authority for Remote Sensing and Space Sciences (NARSS) has a great responsibility to develop policies and strategies to support capacity building in the field of space education to spread the awareness and the culture of these technologies into society through two axes. The first axis deals with the evaluation of existing educational curricula in Egypt to develop appropriation recommendations for curriculum development that cope with the development of international curricula. The second axis deals with the enhancing of the teaching process using the design and development of online tools to promote interaction of students with the instructor and other students in the classroom setting that makes the process of knowledge acquisition effective and attractive to students, taking into

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consideration the training of teachers that lead to the development of their skills.

The constructivists theory (Strommen, and Lincoln, B. 1992; Cristea, S. 2015) was adopted to be based on Geo-spatial technology. Geo-spatial technology involves Geo-spatial analysis, interpretation of Satellite imagery, maps, models, etc. and interpretation of multiple data sets (Wiegand 2001; Cristea 2015; Plucker and Esping 2014; Smith 2016). Recent studies confirm that spatial ability, measured by visualization and reasoning tasks, is a significant factor in Science Technology Engineering Mathematics (STEM) education (Jo 2016).

A framework was developed to facilitate the interaction between teachers, students and content in classrooms that conforms to the Constructivists theory. The framework has been developed with special consideration to the underpinning pedagogical principles. It has been implemented using online tool and mobile application to cover a wide range of possible solutions that help learners to understand the content easily.

The developed framework through its implementation was evaluated through teaching geography curriculum to 10th grade class students in high schools.

The objectives of this paper are to provide an approach to involve space technology and its applications through its implementation using geospatial technology in Geography curricula. The second objective is to investigate the potential of the developed framework in facilitating the interaction between teacher, students and content in classrooms.

The overall design philosophy here follows two major principles: a) adhere to open education, b) use free and open source software components whenever possible.

2. Theoretical Foundation

Cognitive Constructivists emphasis learner-centered and discovery-oriented learning processes (Mogonea, and Mogonea 2013). Cognitive constructivists approach was chosen by many authors (Chichester *et al.* 2013; Gurses *et al.* 2014; Gurses *et al.* 2015; Kwan, and Won 2015; Hsieh *et al.* 2016) as a guiding for their research.

From a theoretical perspective, constructive approach is chosen to facilitate the interaction between teacher and students that lead to construction of knowledge based on Geo-spatial technology in classrooms (Fig.1).

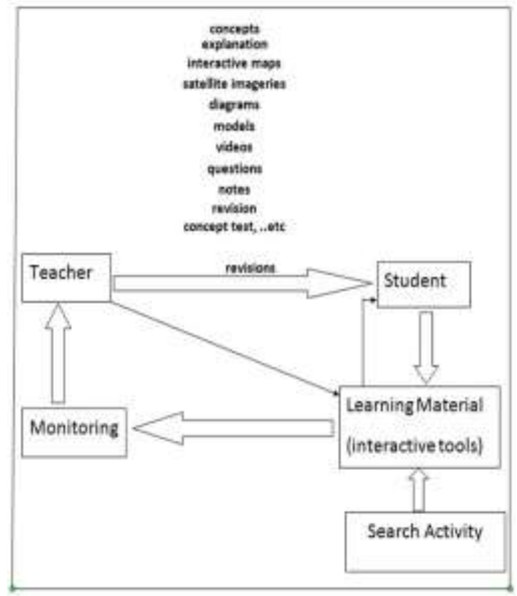

Fig. 1 *Proposed model modified after (Sharaf Eldin et al., 2014b)*

Three types of interactions are encountered in our system: (a) The interaction between teacher and student, (b) The interaction between student and content, and (c) The interaction between teacher and content.

Teacher could use this model as cognitive scaffolding to help the student organizing prior knowledge and internalize new information. Teacher could use the 'on spot' questioning technique (Hsieh *et al.* 2016) to discuss and summarize information to help students organizing knowledge. The teacher gets feedback about students' perception through questions, homework and tests, etc. Interactive maps were used to replace the static maps in the curriculum. Satellite imageries were used to facilitate understanding the concepts of geo-spatial technology. A common justification for using more than one representation was to capture a student's interest as well as playing an important role in effective learning (JISC 2006; Sharaf Eldin *et al.* 2014a).

The formation of interactive maps allows the concepts to be externalized and related to prior understanding in order to create links between old and new concepts and create learning at a deeper level. For example, interactive maps have been used by giving the student a question that can be answered by clicking on areas in the map. When the student clicks on the correct area, the green selectors will appear and when he clicks an incorrect area, a red marker will appear with verbal feedback for both cases (Fig. 2).

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Fig. 2 *Example of using interactive maps*

Regular usage of interactive maps in learning also provides valuable information to the teacher and student. Interactive learning strategies that facilitate interaction of students with other students or teachers may enhance learning outcomes (Sharaf Eldin *et al*. 2014a). The teacher can keep track of learners' understanding of the learning material. The student can visualize and analyze in a way that ensure that the studied concepts are correctly understood based on utilization of the developed system. Finally, students can search for materials when they have free time, and store them for future classes.

3. METHODOLOGY

Authors of the present research work, through an initiative carried out by NARSS to support capacity building and raise awareness with space technology and its applications in schools. In the following sections, the initiative will be discussed. We first discuss SWOT analysis to evaluate the strengths, weaknesses, opportunities, and threats in the Egyptian educational system (section 3.1). Section 3.2 show content of geography curriculum. Third, the developed framework was explained in section 3.3. Lastly, evaluation methods were given in section 3.4.

3.1 SWOT Model

SWOT analysis is a strategic management instrument used to evaluate the Strengths, Weaknesses, Opportunities, and Threats (SWOT analysis) involved in a project, product or in a business venture in order to derive promising future strategies (Rauch, 2007; Wenjing and Lun, 2014). Furthermore SWOT analysis provides a framework for deriving strategies based on promising combinations of found strengths, weaknesses, opportunities or threats. As a disadvantage of SWOT analysis is that after analyzing the external and internal situation of the education, the selection of promising strategies is not supported by quantitative methods (Rauch 2007). SWOT was applied in different fields such as requirements analysis, water management, etc. (Reddy et al., 2003, Rauch, 2007; Pallotta et al. 2007; Srdjevic et al. 2012; Tahernejad et al. 2013). By utilizing SWOT analysis and constructing the SWOT matrix model, we tried to explore the inherent strengths, weaknesses, external opportunities and risks or threats of teaching space technology and adopting appropriate strategies for involving space technology and its applications in the curricula, which is expected to contribute to the improvement of the education quality offered by the educational institutions in Egypt.

SWOT model SWOT model was built by developing strategy for using the strengths in grasping opportunities and mitigating threats for involving space technology and its applications in the curricula in Egypt. The proposed flowchart for developing the SWOT model is shown in Figure 3. Table 1 Show SWOT model for capacity building in space technology and its applications in the Egyptian curricula. Table 2 show proposed strategy to involve space technology and its applications in the Egyptian pre-university education.

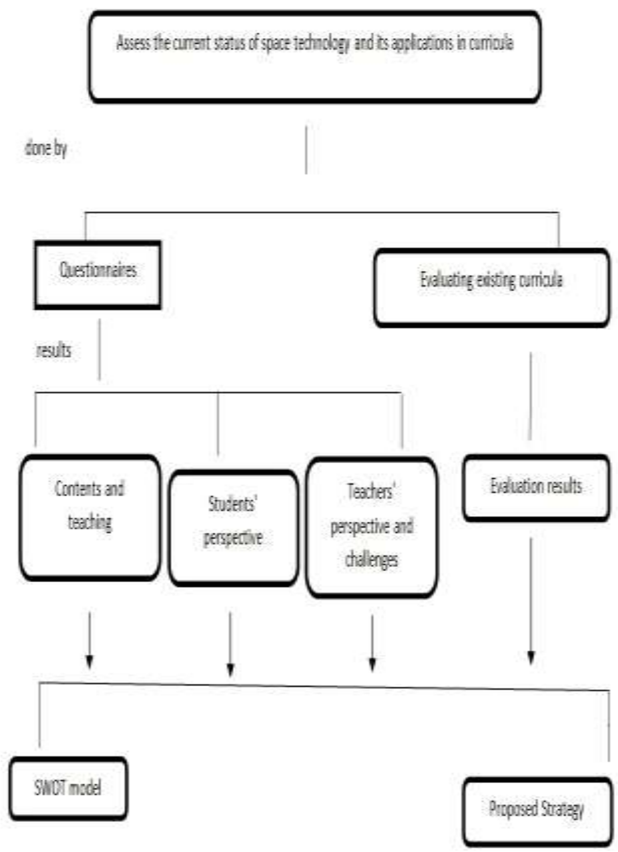

Fig. 3 *Flowchart of SWOT model methodology*

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Table 1 SWOT model for capacity building in space technology and its applications in the Egyptian curricula.

Criteria	Strengths	Weaknesses	Criteria
-Teachers and students -Experience, knowledge, data? -Innovative aspects? -The dominant institutional culture - Academic standards - Educational Programs/Courses - Credibility and Ethics	1-Teaching of some concepts of space technology and its applications in some stages of pre-university education. 2-Students and teachers benefit from space science activities. 3-The existence of IT labs in some schools 4-Interest of some schools in providing a permanent lab for space technology. 5- Most students are interested in computer-based tools. 6- Most students exhibit high interest in space technology. 7-Interest of teachers in effective & efficient training of space technology.	1-Space technology curriculum is not exist or insufficient in some stages of education. 2- The lack of clarity of the idea and its relevance to the students and teachers on space technology. 3- There is no institutional support for the teacher to pay attention to the idea. 4- Lack of interactive educational tools 5- Lack of computer labs for teaching space technology. 6-Teachers' insufficient knowledge of how to teach using GIS. 7-Lack of experience using spatial information. 8-Lack of curriculum based material 9-Lack of GIS-based textbooks	-Negative changes in the systems and laws - Competitors and attitudes - Negative changes in the power of the society - Trends of parents - Financial resources - Lack of availability of time - Schedules and deadlines and pressures? - Changes in the priorities for action - Changes in the structure of the institution - Not to encourage school climate.
Criteria	**Opportunities**	**Threats**	**Criteria**
-New technologies, services, ideas? -Vital contracts and partners? -Sustaining internal capabilities? -New regulations and legislation -Strategic plans of the Ministry of Education -Participation in social and environmental development - Technology development and innovation?	1-The availability of qualified human resources in the sector of space science and applications11 between various universities and research centres. 2-The current university interest in space science and the presence of some Egyptian universities in this scope. 3-The availability of a number of teachers that can raise their efficiency through training and motivate morally and financially. 4-Care and adoption of students whose experience who excel in this scope. 5- The emergence of new technological technologies with a positive return to the educational institute.	1- Limited attention to this sector in educational institutions. 2-Lack of a common strategic framework for the educational process, and lack of commitment to it. 3- Change of governments and ministries in a short period. 4- No cooperation between the scientific and educational institutes in this area. 5- There is insufficient awareness and culture of space technology in educational institutes. 6-Lack of financial allocation directed to education and training in space and its applications. 7-Lack of continuity in the follow-up to motivate students.	-Competitors' vulnerabilities? -Volumes, production, economies? -Seasonal, weather influences? - Legislation and political system on the local and national level. - Changes in government policies and lack of cooperation with international institutions developed in this area

Table 2 Proposed strategy to involve space technology and its applications in the Egyptian pre-university education.

Strategy	Execution
Development of curricula and activities to match Egyptian curricula with European curricula, in terms of content and teaching methods. Development of interactive tools for learning from KG to K12.	-Make a cooperation protocol between NARSS and Ministry of Education -Identify the most useful learning technology competencies for students and prepare a special guide for the teacher and the student. - Expanding activities in the curriculum and linking them to life aspects of students.
Design awareness programs and activities to promote the culture of space technology in schools and society.	- Qualifying a team inside each governorate - Holding workshops for schools to introduce them to space technology and how to teach them and what is new in this regard. -Train educators on the requirements of implementing awareness programs to contribute constructively in the development of education. -making activities related to space technology within libraries - Field trips for students to visit some institutions interested in space technology.
Developing evaluation systems	- Developing the evaluation systems and linking them with the developed curricula, and training teachers on them. - Analysis of national test results, identifying strengths, weaknesses, opportunities and threats and suggest proposed solutions to support decision making.
Care and adoption of students whose experience excel in this scope	- Make competitions between schools to select the best talents -Provide awards for talented students
Provide cost-effective technological infrastructure that meets the needs of learning process.	-Finding the best appropriate technological solution versus the cost framework - Provide schools with appropriate solutions for them.
Provide free open educational resources.	-Making protocols with universities, research centres and scientific institutions to produce educational materials useful to both students and teachers. -Upload all materials on Ministry of Education's website to be available for all.

3.2 Content of geography text books at pre-university education.

The curricula were obtained from the website of the Egyptian Ministry of Education (http://elearning1.moe.gov.eg). Units 1 and 2 from curricula of geography for 10^{th} grade were selected for the development of online material.

3.3 System Framework

System framework includes four tiers:
Learning theories and teaching techniques tiers define how the constructivist learning theory and the used teaching techniques were taken into consideration and the interaction between them (as illustrated above in theoretical foundation section).
Technological tier defines steps of the developed tools.
Instructional design tier determines how the instructional material was designed in the developed system to achieve the specified learning objectives as follows:

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During the instructional design phase, the following questions were considered as objectives of the learner's course: (a) How should the content be organized? (b) How should ideas be presented to learners? (c) What delivery format should be used? (d) What types of activities and exercises will best help learners? and (e) How should the course measure learners' accomplishments?

Customer analysis (i.e. for the Ministry of Education) was used to collect information from the customer about the content and the course mainly included the following: a) the motivation for the educational content. b) The skills which the learner will acquire after completing the course. c) If there is a new or alternative content. d) How much does the content change? e) Is it possible to submit content to a student online? f) The duration it takes to complete the course.

Learner analysis; the key to instructional design is to work around the audience and their expectations, rather than the content. Therefore, for a learning program to be effective, it must be stimulating to the minds of the targeted audience. It is needed to know more information about students in various disciplines such as a) Educational background. b) Learning atmosphere, c) Technological knowledge. d) Motivation issues. e) Visualization styles.

Technical analysis was also used to collect the essential information about technical requirements to run the course properly; these requirements mainly included a) Software and programming capabilities. b) Material resources. c) Teamwork and skills. d) Final output.

Structure and content analysis were also used to collect the essential information about the course and the content structure. Figure 3 concludes the system framework.

The developed framework was implemented using HTML5, java script and action script languages. Adobe Photoshop, Adobe Illustrator, Adobe After-effect, Adobe Premiere and Adobe Edge Animate were all used in the graphic design as well as the animation. The system has been deployed on Microsoft Windows 8 platform and WampServer as web development environment.

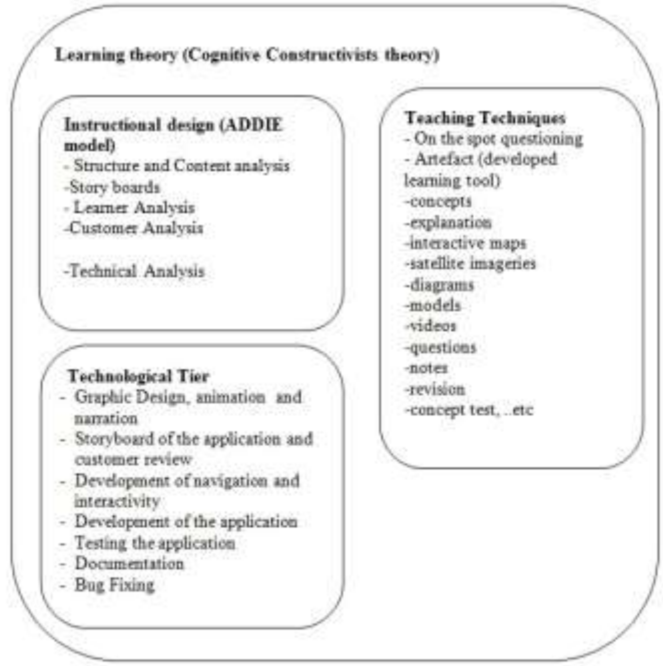

Fig. 4 *System framework*

3.4 System Evaluation

Effectiveness of the system was measured by using a variety of objective and subjective assessments; including pre/post knowledge tests, curriculum tests, rating scales, semi-structured interviews, and written/online surveys (Salter *et al.* 2014). In the current study, Kirkpatrick's model (2011) was used to guide outcome measures. Our objective was to determine the effectiveness in terms of learning and results. Pre/post knowledge tests were used to assess the learning and results outcomes.

The purpose of the evaluation was to explain the role of giving course with the online material to 10th grade class students. Therefore, we try to answer the question of: Is there any significant difference between pre-test and post-test points of the controlled group that applied the computer-assisted education (using the developed system) and controlled group that applied the traditional education?

The evaluation also includes a questionnaire for teachers about (a) general knowledge about space technology and its applications, and what teaching methods are used, (b) their attitude to learn space technology and its applications and what are challenges facing them, (c) resources availability, use of modern technology and challenges.

Descriptive, reliability statistics and bivariate correlations were computed. Differences between the believes of teachers on the importance of having educational content related to space technology and their desire in getting training to teach space technology in effective way using nonparametric tests were analyzed. Variance between teachers' opinions for having activities related to space technology at each stage of the pre-university education using Kruskal-Wallis Test (McDonald 2014) was also calculated and analyzed. For

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these analyses, teachers were classified into three groups based on the stage in which they teach. These groups are primary school teachers, junior high school teachers and secondary school teachers.

3.4.1 Participants

The sample consisted of 63 students from two high schools in Cairo.
Teachers' survey sample included; 37 from primary schools, 16 from junior high schools and 44 from secondary and technical schools. Teachers specializations were Science, Geography, Arabic language and English language.

3.4.2 Data Collection

The data was collected during the academic years 2016-2018. In a two day workshop, teachers were introduced to the new system and its functionalities before the actual evaluation has taken place. According to Egypt educational rules is to take informed consent from students' guardians, so this study was conducted with permission of the Egyptian Ministry of Education.
All data were collected and maintained in a Microsoft Excel sheet. Statistical analyses were performed using SPSS. ANOVA statistics were computed. Independent samples test using Levene's Test (https://www.statisticshowto.datasciencecentral.com/levene-test/) for equality of Variances and t-test for equality of Means is computed. A P_value <= 0.05 (https://medical-dictionary.thefreedictionary.com/p+value), 95% confidence level and reliability with Cronbach's Alpha > 0.6 were considered statistically significant in all analyses. Size of effect (https://www.uv.es/~friasnav/EffectSizeBecker.pdf) was calculated using Cohen's d (https://www.uv.es/~friasnav/EffectSizeBecker.pdf) as follows: "Small, d < 0.2," "Medium, d > 0.2 and < 0.5" "Large, d > 0.5"

4. Results

Results have been divided into (1) students' perception evaluation through examination, and (2) teachers' perspective evaluation through questionnaire.

Student's perception evaluation
First of all, both schools were examined by pre-test. Table 3 show scores of achievement by independent t-test. Mean scores were 15.9, 17.3 for both schools, respectively. An examination of the t-test table; t value was -1.87, % 95 confidence interval, bottom (-3.0) and top (0.1). There was no significant difference between pre-test on mean scores. This indicated that prior knowledge about the subjects of both schools was almost equivalent level.
Both schools were examined by post-test. Table 3 show scores of achievement by independent t-test. Mean scores were 18.6, 18.3 for both schools, respectively. An examination of the t-test table; t value was 0.70, 95% confidence interval, bottom (-0.6162) and top (1.28). There was no significant difference between both schools in post-test on mean scores. This indicated that both groups almost equivalent educational level.

The other comparison has been done, to see if the experimental group is more successful than the control group academically. These findings are shown in Table 3.
For school #1, it is clear that at degree of freedom (df) = 30, 95% confidence level and t = 4.69. This indicated that there was statistically significant improvement in knowledge of students after using the developed system; where the mean of scores with traditional instructional method was 15.9 while with developed system was 18.6.
For school #2, it is clear that at df = 31, 95% confidence level and t = 5.2 indicating that there was statistically significant improvement in knowledge of students after using the developed system; where the mean of scores with traditional instructional method was 17.3 while with the developed system was 18.3.

This indicated that teaching with the developed system was more effective than the traditional education in both schools. To calculate the size of this effect, ETA was calculated where ETA for school #1 was 42%, and for school #2 was 46%. According to Cohen'd, the size of effect was found to be medium for both schools.

Table 3 Pre-test and post-test score averages of t-test results

Paired samples statistics for Elsayeda Aisha school

		Mean	Std. Deviation	t	df	P_value	Eta
Elsayeda Aisha school	Post-test	18.613	2.0925	4.690	30	0.000	42%
	Pre-test	15.903	4.0113				

Paired samples statistics for Pioneer school

		Mean	Std. Deviation	t	df	P_value	Eta
Pioneer school	Post-test	18.281	1.6507	5.150	31	0.000	46%
	Pre-test	17.344	1.6774				

Levene's Test for Equality of Variances and t-test for Equality of Means

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Post-test	Equal variances assumed	4.030	0.05	0.700	61	0.487	0.3317	0.4740	-0.6162	1.2795
	Equal variances not assumed			0.697	57.020	0.489	0.3317	0.4758	-0.6211	1.2844
Pre-test	Equal variances assumed	20.355	0.000	-1.870	61	0.066	-1.4405	0.7703	-2.9808	0.0998
	Equal variances not assumed			-1.849	39.916	0.072	-1.4405	0.7791	-3.0152	0.1342

Teachers' perspective and challenges
Results of the survey carried out on the primary schools teachers (Table 4) revealed that there was intermediate positive relation between the belief of the teachers of the importance of having educational content related to space technology and their desire in having training to teach space

technology in an effective way with correlation coefficient = 0.440.

Table 4 Results of the survey given to the primary schools teachers

	N	Minimum	Maximum	Mean	Std. Deviation
-Is there educational content related to space technology at this stage?	37	1	3	2.00	.943
-Are there activities of any kind related to space technology at this stage?	37	1	3	1.62	.828
-Do you believe in the importance of having educational content related to space technology at this stage?	37	1	3	2.59	.599
-Are the concepts of space technology easily understood for students?	37	1	3	2.14	.713
-Does the school capable to do this job in satisfied way?	37	1	3	1.97	.833
-Do you have the interest and ability to teach this content in a creative way?	37	1	3	2.41	.725
-What do you think of training some teachers to do the job in an easy and correct way?	37	1	3	2.78	.534
-Is the content is convincing for the teacher and easy to teach?	37	1	3	1.89	.774

Survey results carried out on KG teachers (Table 5) revealed that there was an intermediate positive relation between the belief of teachers of the importance of having educational content related to space technology and their desire in having training to teach space technology in an effective way with correlation coefficient= 0.337.

Table 5 Results of the survey given to KG teachers

	N	Minimum	Maximum	Mean	Std. Deviation
-Is there educational content related to space technology at this stage?	26	1	3	2.31	.736
-Are there activities of any kind related to space technology at this stage?	26	1	3	2.46	.647
-Do you believe in the importance of having educational content related to space technology at this stage?	26	1	3	2.73	.604
-Do you have the interest and ability to teach this content in a creative way?	26	1	3	2.65	.562
What do you think of training some teachers to do the job in an easy and correct way?	26	1	3	2.85	.543
-Is the content is convincing for the teacher and easy to teach?	26	1	3	2.42	.758

The junior high schools, survey results (Table 6) revealed that there was no statistical relationship between the belief of teachers of the importance of having educational content related to space technology and their desire in having training to teach space technology in an effective way.

Table 6 Results of the survey given to junior high schools teachers

	N	Minimum	Maximum	Mean	Std. Deviation
-Is there educational content related to space technology at this stage?	16	1	3	2.25	.856
-Are there activities of any kind related to space technology at this stage?	16	1	3	2.00	.816
-Do you believe in the importance of having educational content related to space technology at this stage?	16	1	3	2.63	.806
-Are the concepts of space technology easily understood for students?	16	1	3	1.75	.931
-Does the school capable to do this job in satisfied way?	16	1	3	2.13	.806
-Do you have the interest and ability to teach this content in a creative way?	16	1	3	2.13	1.025
-What do you think of training some teachers to do the job in an easy and correct way?	16	1	3	2.75	.683

The secondary schools, survey results revealed that there was no reliability of the responses of teachers.

Comparing survey results carried out on the different grades (Tables 4 through 6) revealed that there was significant differences between responses (answers) of teachers from all stages.

Extracurricular activity (https://en.wikipedia.org/wiki/Extracurricular_activity) was also measured. The amount of activities can be arranged, from high to low, as follows: KG, junior high schools, and primary schools (Table 7). Because of the lack of reliability between teachers of the secondary schools, it was not included in the table (7).

Table 7 Variance between activities related to space technology and its applications in different grades

Group		N	Mean Rank
Are there activities related to space technology at this stage?	KG	26	88.31
	Junior high	16	70.59
	Primary	37	54.96

There was a significant interest in learning space technology and its applications for both teachers and students. The study participants also reported the need to develop programs on space technology and its applications for schools.

Because the concepts of space technology and its applications are embedded in many different disciplines, the best approach to teach it as interdisciplinary system and via Geo-technology (Kerski 2008). However, the most important challenges facing teachers were the lack of time, financial support and teachers have no competence enough to work with the software.

Teachers also highlighted their need to (a) scientific curriculum, books and appropriate extracurricular activities related to space technology, (b) training courses, (c) financial allocation directed to education and training in the field of space technology and its applications, (d) care and adoption of excellent students in this scope, (e) field visits to institutions related to space technology, and (f) conduct competitions between schools.

5. Conclusion and Further Work

Findings have shown that interactive settings in learning environment can promote greater student communication. The proposed framework could be effective guide in implementing interactive learning environment to promote interaction of students with the instructor and content in the classroom setting. Based on the findings, there was a significant improvement in knowledge after using developed system with medium magnitude. Overall, the findings show that learners considered geo-spatial technology based tools as an acceptable instructional format in schools. It is recommend when designing interactive teaching environment, a detailed framework of analysis, planning and implementation should be developed to ensure its success.

The current study recommends schools to use computer-aided learning as a tool for learning for both students and teachers. It also recommends the institutions concerned with space technology and its applications to promote awareness of space technology for students in schools through communication with the stakeholders to develop curricula, design computer-aided tools and programs for both teachers and students.

Further work will include a) Extending the system to include all curricula. b) Extending the system to support online assessment.

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