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A Model Suggestion For STEM Activity Design Within The Scope Of The Curriculum

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Abstract
STEM which can be used for educating students at every stages, has product and practice based activities at its basis and integrates different disciplines is a new educational approach used as an acronym for the words Science, Technology, Engineering, Mathematics.
Education must focus on the humanly fields such as creativity, critical thinking, collaborating and problem solving that can not be solved via machines or information technologies. But it is not quite possible to have the individuals acquire these abilities by using classical educational understanding. Therefore, it is crucially important developing well-structured STEM activities and the individual's making mistakes by getting into incorrect directions during the education process, achieving the solutions by using trial-error method and via his/her own cognitive and operational processes. In the STEM field, attempts by partially public and by partially private sector are encountered in our country. But unfortunately, it can not be possible to correspond the STEM activities that are prepared for considering the curriculum of different countries with the curriculum applied in our country exactly. Putting forward the processes that are structured considering the curriculum and inside the process the students' using their humanly abilities in developing STEM activities are such as to form the basis of the studies that are made in the field of STEM in our country.
In this study, it is tried to design a well-structured STEM activity by examining the curriculum of Maths, Science Technologies, Information Technologies and Software courses and a sample STEM activity designing process has been developed.
Key words: STEM, curriculum, activity.

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Introduction

Sovereignty of nations in global world, in the every period, of the period from the science and technology's benefit by building on the highest level for a prolonged production until today and this is developed on the value chain. Inside we found and also we call as information age this is unchanged, product of the information age and the first time developed nations the means of production maintain their global dominance.

Furthermore, most important moiety one information of information age and itself has transformed to meta and It has become the most valuable asset of the global economy. İnformation as a meta be associated with science result of the emerging professional groups, The level of benefit have gained reputation from the information in the job.

The goal and necessity of education also occurs at the point. Producing and using of information is a meta in itself. Information's being scientific and computable, production orianted and at this point espeacially as 21st century is of big importance to be technology oriented.

Education systems are often part of the national curriculum to train in the best possible quality of its citizen and aims to be available within the global economic system.

For this purpose, to make significant changes in the nature of reforms in the nation's education programs periods, follow the example of the other, they go into business together.

Reformist curriculum change in our country, Ministry of Education , Chairman of the Board of Education (TTKB) by the European Union in 2004-2005 was performed within the scope of what the integration process . But Student Selection and Placement Center (ÖSYM) both as based on OECD data unfortunately, it is not possible to say that the very success of the education reform movement.

In this study, into the education system in our country, briefly called STEM and science, technology, engineering and mathematics fields has made quite a new model of education and information about the implementation of the model for our country to use a multidisciplinary approach. A STEM activity that is based on the curriculum and suggestions will be implemented STEM model is designed for integration into the education system of our country.

What is STEM?

STEM, almost encountered in higher education all practical being at the root of science, Science, Technology, Engineering and Mathematics disciplines brought together a multidisciplinary a new teaching mode. In order to understand better be referred to short term form the acronym STEM;

Science: Nature, materials and observing the physical universe, to formulate the test and measurement based on behavior and is expressed in general terms (Science, 2016).

Technology: In a particular of information, cretion of technical of information, use and live with and associating environmental, industrial arts, engineering, design work is done on the applied sciences and pure sciences (Technology, 2016).

Engineering: The Pratical application of information, production on the basis of the design and construction of science is conducted (Engineering, 2016).

Mathematics: A group of related science, algebra, geometry and calculations regarding the number, the size is expressed with special notation form and with the relationships between them (Mathematics, 2016).

When we bring together the concepts contained in our STEM almost all of the conclusions we arrive applied sciences and job fields through the integration of these four concepts.

If at this point will be redefined in terms of STEM educational; STEM education interdisciplinary and approaches to science, including applications, technology, engineering and mathematics is an education system a discipline that enables the integration of establishing a connection between each other (Akgündüz, Ertepınar, Ger, Kaplan Sayı & Türk, 2015; Bybee, 2010).

STEM integration in America 1990's have been identified in the field of education in the first period. This integration can produce high-tech based economy in the information society, complex technology and engineering skills, high-quality response to the demand for labor in America intended as a solution to the education reform. In fact, the primary focus of the interdisciplinary STEM education for the 21st century workforce situations they will encounter students with the skills requirements of the preparation (Obama, 2009).

In the past year in our country, a number of initiatives following the curriculum has been updated TTKB. Turkey Industrialists Businessmen's Association of Turkey published by the STEM Workforce increase the STEM workforce with the report and stated that universities should increase the STEM fields. Workshops for the STEM education by Istanbul Aydin Universty, training and certification programs are organized. As well as in Istanbul Aydin University, Turkey' s first STEM laboratory was established and STEM Center opened. They published in Turkey Report ,the entry of a qualified STEM education curriculum implementation and underlined (Hacıömeroğlu & Bulut, 2016).

Response to these studies in last years it is seen that students get bad results in national and international tests and report in mathematics and science fields. When YGS (Transition to Higher Education Examination) and the PISA (Programme for International Student Assessment) results are analyzed. In the last 6 years of YGS 40 questions asked in the sciences students versus 4.74 average, the response to 40 questions asked in mathematics seems to have 7.8 average. In PISA exam conducted by the OECD, Turkish students in the field of science is seen that in the last place 448 in mathematics and 463 (Akgündüz, 2016; OECD, 2015; ÖSYM, 2015).

In this case, the basis and carried out by STEM, TTKB similarly counted among the 21. Century skills training structuralism, to question, to use technology effectively and aims to win comprehensive problem-solving skills it does not coincide with curriculum changes.

21st Century Skills

21st Century skill set for forming keep together seven components must be combined. These; Information technology literacy, communication skills, critical thinking and problem-

solving ability, creativity and ability to meet, global awareness, cooperation, and provide self-direction being able (MacLeod & Kraglund-Gauthier, 2015).

If students will be prepared for 21st century skills and if they have to work and learn in these fields , our teachers and teaching methods also must be appropriate. The problem, according to the existing training curriculum and training in accordance with the 21st century skills and how can we allows current technology (MacLeod & Kraglund-Gauthier, 2015).

Another problem seen in our country, in the transition from secondary education to higher education almost no one involved in the examination system and the scope of 21st century skills, there is lack of test system of measuring these skills.

If both the problem arises when one considered the following table. Students in line with 21st century skills in secondary and university education, how much of the current examination system, they will receive a good education they would not be used to measure these skills in STEM education, which leads to a huge gap in the education process. The existence of such a separation is meaningless in terms of the secondary STEM applications.

But the truth is, the majority must be made through an objective examination being able to select a qualified minority in a group!

Method

The question is exactly that: Both in secondary education as well as in higher education, we want our students to apply STEM education to equip with 21st Century skills. But the transition from secondary education to higher education are also supposed to be an objective selection system. We need to search for answers to this question within the framework of STEM education.

Our Curriculum and Relavence to STEM Education

As is known, the Ministry of Education curriculum in our country's depending being developed by TTKB and put into practice. The general structure of programs as, students are required to be given to achievements, to be associated with the subject and is based on the teaching methods and techniques to be used for this purpose.

STEM education is similar in a way, to be given to students from different disciplines of the desired outcomes, is combined with STEM activities, 21st century skills to be imparted to students is based on using.

With the integration of STEM education programs, application of two different methods can be used. These are the methods of integration of content and context. The meaning of content integration, structured or semi-flexible, is the creation of a STEM curriculum that covered more than one discipline (Roehrig, Moorei, Wang & Park, 2012). In the context of integration, the discipline taken center of other disciplines, ignoring the essential characteristics of this discipline, promote the center dicipline (Çorlu, Capraro & Capraro, 2014).

No matter which method will use, if the curriculum required to achieve integration without modification of existing structures, it is clear that the field in the curriculum should be moving through acquisitions. So the gains in the curriculum, students are required to transfer them to the design of STEM activity.

Applicability of our School of STEM Education

In our country coterie name, given to the class teacher working in the same branch in school. Coteries, in their schools, industry related courses or curricula to convert the weekly schedule for the school year in accordance with the national curriculum and implemented with the approval of the school administration. This version with a teacher's job, branch courses or lessons that work is confined to implement with the approval of the school administration. Branch clan is engaged in the meetings at the provincial and district order to better education in this branch.

Otherwise, clan collaboration between students learn better way foreseen in the studies but also frequently encountered in practice is rarely. Coterie of international cooperation should be at the highest level in terms of STEM education is a problem that must be overcome in this case. In order to overcome such a problem, in which all branches of the academic year, all prepared under the standards set and it is possible to act on yearly plans. With a simple approach, if different subject teachers, if the other branches of the week which they knew or understood what topics they know, you can benefit from it for his own lesson, branch teachers work in the association by students to cover a few different lessons and recovery efforts in other words, they can make STEM activities. If teachers do finding the intersection of industry achievements cooperation, in their own branch in STEM transfer efficiency gains can be embedded or integrated into the activities of the students inside (Quang, Hoang, Chuan, Nam, Anh & Nhung, 2015).

Good Structure of a STEM Events

Such an integration in although not a frame has been said by many researchers that allows students to meaningful learning, interdisciplinary education (Beane, 1995; Childress, 1996; Jacobs, 1989; Mathison & Freeman, 1997). Coming together of different disciplines STEM education, realization of meaningful learning is achieved as a result of information learned by establishing a connection between the information encountered in real life. STEM activity integrated into a lesson with this point will also provide meaningful learning.

Between different branches of the planning process required to develop a STEM activities can benefit from these steps :

Step-1: Teachers should be working with STEM related fields and content (Technology, Mathematics, Science etc.)

Step-2: Teachers STEM 's associated learning outcomes (knowledge, skills and attitudes) and decide on the relationship between learning content and must decide whether integration is possible. Teachers should be resorted to each gain for the learning materials, books and other resources.

Step-3: Teachers are chosen for their achievements without ignoring the STEM fields should plan an event of interest to students. While doing this, although it was fun for the students, they should not lose sight of the main achievements in the lesson of events frame.

Step-4: Teachers should activity developed primarily applied themselves, if they necessary revise their activities. Teachers should be ready for any questions that may come from students.

Step-5: Teachers are implementing activity should work with individual groups of students. Teachers should may need research resources and tools will use equipment be provide to students.

Step-6: Each group of students should be asked to process the realization of the event and to make written results.

In addition to these steps, cooperating teachers, educational features of STEM activity, economic characteristics and safety requirements is essential not to ignore.

Types of Schools for STEM Education

STEM schools have attracted the attention of researchers in recent years although they are also based on the fact that 100 years ago. STEM schools are called as historical Science, Mathematics and Technology Expertise were being called schools (Olszewski-Kubilius, 2010; Subotnik, Tai, Rickoff & Almarode, 2010, Thomas & Williams, 2010). In terms of our country, Science and Anatolian High Schools, High Schools and Vocational Schools can be considered as flat, there are three different types of literature specializing in STEM school type. These are Selective STEM Schools, Comprehensive School and Career Focus are STEM STEM school.

Selective STEM Schools; Focused on multiple STEM disciplines, students are schools that they have been accepted by a number of criteria including success in school. Students in these schools, accompanied by specialist teachers are trained in advanced laboratories and other resources in accordance with a rigorous curriculum (NRC, 2011; Subotnik, Tai & Almarode, 2011).

Comprehensive STEM Schools; Appealing to the broad masses of the population, they have been accepted in accordance with the students' achievement levels are below the average school students can be found at (Lynch, Behrend, Burton & Means, 2013; NRC, 2011; Rogers-Chapman, 2013).

STEM Career Focused Schools; Students comprehensive training centers are established in line with the interests STEM. Mostly in science, mathematics and technology, and focused on the most important focal points are to perform on the real life applications of STEM focus (NRC, 2011; Stone III, 2011).

Institutional integration at different levels of almost all secondary STEM education programs applied as can be seen in our country seems to be possible.

Teachers seem possible applicability of our schools will be established through a cooperative education program gains. Another issue to be decided is necessary to determine

which approach will use the STEM activities to be held. After determining the cause of coming from corporate STEM approach to use, depending on the quality of students in different types of institutions is the need to consider.

Approach and Implementation of Education Programs in STEM Education

STEM education activities within the scope of their competence in the discipline-based applications aimed on teaching and although, STEM activity of an application is the realization comes in different ways. It can be regarded as a complement to the STEM education methods are as follows (Goh & Bilal Ali, 2014):

Based on Standards: A systematic retrospective evaluation of the curriculum. Standart curriculum is a design concept (Wiggins & McTighe, 1998). The method being implemented in the central system exam in our country.

Design Concept: The most research is done on the paradigm of curriculum with extensive use. This approach is not only the result of the student trainee process also is an element of the evaluation process itself (Goh & Bilal Ali, 2014). In our country, the performance of students in the classroom and begin implementation of the new curriculum has also been included in the assessment to be considered.

Inquiry Based Teaching and Education: This approach advocates the questioning approach in education. Activities in STEM education curriculum, confirmatory, structured, guided and must be open to question building blocks (CurrTech Investigations, 2008). In terms of new curriculum in our country again, exploring the students to gain the desired, questioning, individuals learn learning approach is fully consistent with the goal of raising.

Problem Based Education: This approach is student-centered approach, students made their own experience after conversion of cooperation and in resolving the problems and questions answered. Characteristic features; i) education is a challenge based on open-ended questions, ii) students works in small collaborative groups, iii) It is to facilitate the role of teacher education (Goh & Bilal Ali, 2014).

Performance-Based Teaching and Education: Students who wish to approach and results and performance in the process. Made a lot of evidence obtained in studies conducted with this approach to teaching, training and assessment showed that improve student achievement (Borko, Flory & Cumbo, 1993; Falk & Darling-Hammond, 1993; Koretz, Stecher, Klein, Baker, McCaffrey & Diebert, 1993; Smith, Noble, Cabay, Heinecke, Junker & Saffron, 1994).

5E Education, Teaching and Evaluation Cycle: 5E cycle (responsibility, discovery, description, preparation and evaluation) many curriculum designerby educational researchers that effective planning and teaching students to improve their performance in terms paradigm and advocated a direction (Colburn & Clough, 1997).

Electronic Curriculum Integrated Electronic Instructional Technology: STEM education allows students to submit a teaching program using non-traditional ways. High-quality educational programs at the local level in a curriculum designers and teachers can be made available more by practitioners. Many advantages over traditional paper-based curriculum is available. For example, making web based updating and use of appropriate

personal use planning for the detection of STEM education and crossovers between different branches can be achieved through a fully electronic system. In addition to supporting the use of ICT equipment in the classroom and be able to provide the enjoyment of all the benefits of STEM education curriculum (Goh & Bilal Ali 2014).

Duty and Formative and Summative Evaluation of Non-Point Tasks: Today's standard of skills, processes, queries and content, based mostly on the strength and richness considers necessary to ensure the correct answer or performance. Alternatively, the evaluation of the student's structuralism, can reveal the presenter and performance has started to benefit from non-traditional formats (Doran, Chan & Tamir, 1998).

A STEM education curriculum is expected to consist of the following components (Goh & Bilal Ali, 2014):

- Must be between disciplines
- The interdisciplinary philosophy must be based on complementary standards
- Must be defense retroactive assessment
- Both problems should use as the basis of teaching and learning based on performance
- It must be in electronic format and should receive support from their information technology equipment
- It should be formal and specific assessment to do

In addition, as seen in our country in case of pre-implementation by providing integration with the existing curriculum;

- In the current curriculum it has been determined from the intersection of the branches should be clarified and the expected recovery of STEM activity
- Application of STEM activities and by whom, when and where it should be determined to perform
- Evaluation of the efficiency of STEM, must be carried out with cooperation interbranches.
- STEM will be used in the event of equipment and solutions for the supply and use of common materials should be developed.

Results

The main benefits of STEM education are as follows (Morrison, 2013):

- The development of problem solving skills
- Using creativity to contribute to the development of basic knowledge and skills
- To contribute to logical thinking
- Understanding the nature of the disclosure and to provide technology
- To allow for critical thinking
- To provide interdisciplinary perspective
- Learned to be permanent, the achievement of robust and more easily associated with the previous information,
- Design, development of design and prototyping capabilities

The applicability of STEM education in schools, a good activity of structure of STEM,

STEM school types, after having regard to their approach and implementation of STEM education curriculum to plan an event in the context of STEM education programs, and, if desired, to convert a model that can be generalized, first we will need to answer these questions.

- What kind of planning to be done for a school?
- Which of the STEM disciplines available at the school?
- STEM disciplines within the scope of subject teachers in which they want to see the achievements of their branch event planning education?
- Which STEM approach will be used?

Curriculum Framework of An Example STEM Event Framework

Planning process to come together as a mixed group of branch teachers meeting and Uncovering of branches STEM activity plans from the same clan as well as meeting and determination of its branches will be implemented in the week or weeks of their yearly plans.

Mathematics (TTKB, 2013), Science and Technology (TTKB, 2013) , Information Technology and Software (TTKB, 2013) project-based classes for 5st classes according to a STEM, if you wanted to design a simple activity;

Table 1. Selected achievements and standards of the Curriculum

Lesson	Learning Area (or learning level)	Earnings (or standart)
Mathematics	5.2. Geometry and Measuring	5.2.1. Basic geometric concepts and drawings
Science and Technology	4.6. Simple Electrical Circuits / Physical Events	4.6.1. Simple Electrical Circuits
	5.5. Let's recognize and travel our living things/ Living and Life	5.5.1 Let's Meet with living things
	5.6. Indispensable our life: Electrical / Physical Events	5.6.2. Display Symbols and Circuit Diagrams Circuit Element
* Information Technologies and software	Basic Level 1-2	Problem Solving Approach
	Basic Level 1-2	Algorithms and Strategy Development
	Basic Level 1-2	Programming
	Basic Level 1-2	Software Project Development, Implementation and Dissemination

* At this curriculum Basic 1st and 2nd Level standarts has been taken into consideration, because this curriculum is based on the standart.

Example: STEM activities for all project based planning, in sub-steps preparation Query Based STEM activity capable considered envisaged. STEM activity, all students in a school that accepts general, developed in mind that there are teachers in the activities of all branches.

Instruction : Science Lessons 5.5.1. What of the information they obtain information gathering about the various creatures living in recovery framework to observe the way they move prompted. Students Based on this observation Mathematics 5.2.1. They observe the movement of live shows with the straight lines in the direction of recovery are asked to make drawings. Students will be given a number at this stage and can test the various models they

can observe the movement of live. Science students from the previous year of the course 4.6.1. reminded simple electric circuits acquired in acquisitions if considered as an electric circuit of a live each joint is required to be made whether to reflect on an electrically operated puppets. Science 5.6.2 of the current year's course. each major joint in a living salvaging the framework of their choice (head, feet, tail like) are asked to draw a simple circuit. The motion of living things Math on the joints 5.2.1. acquisition transactions occurred at angles of a few degrees in the direction of the surveying asked.

According to the standards specified in the course information technology and software, the natural behaviour of the species they are working on ranking in the movements of the joints, sitting, while walking and running it into a series of movements they perform are asked to bring. Students are asked to list the behaviors of repeating a series of movements of living things. Students can run a new circuit if the movements of the creature in the desired order if we had a living puppet that can move itself prompted to question if we can do.

Information technology and computer software course within the framework of standards prompted the movements of the puppet commands with a simple program transformations. While doing this, from students asked to consider the movement of each joint as a separate function. In the process of moving a Live puppet in this way, the operation can be performed with the desired functions in the desired order.

If desired the continuation of this STEM activity, the teacher the students under the supervision of a puppet that can be made out of cardboard, smaller engines can be obtained by using a simple moving puppet live.

Application:Brach teachers within their lessons in the case of this application, parts to be performed by each teacher in their class may be able to undertake operations on the part as to be performed within the time course that is independent of the event time, it is possible for a STEM.

Evaluation: Activity within the process will attract the students to do drawings, photos, and video output of a portfolio together and in the file that the student as their sentences as a project report on the process of participants, can be used in the evaluation of the event.

Discussion

Any change in the existing curriculum in our schools for the implementation of STEM activity is not required. But, like in our application example to earning base or the different types of standards-based curriculum design activities have to be combined in cases where it is available. STEM activities to earnings base curriculum design will be easier.

The effectiveness of stem education programs in terms of how it would be implemented as an independent team although the gains to be achieved by a student, will not be able to establish associations with the teaching programs in the evaluation process. Additionally, the effectiveness of stem education programs to be performed in an independent manner, the quality of the educational entertainment will be able to cause to pass in front of goal.

Unfortunately in our country there are many overseas examples of the effectiveness of the application of stem applications have to consist, without the implementation associated with instructional programs, unfortunately, may cause the required level of efficiency not being able. Moreover, commercialization also developed many educational toys are being released in a similar way, and cater to a specific age group, although this age group in terms of the outcomes of the teaching programs there isn't any information about how they can meet

Posed by the United States of America and the science, technology, engineering and Mathematics (STEM) Education strategic plans have been developed and implemented at the federal level is adopted and own, STEM is quite intensive studies in the years to come about to perform (NRC, 2011).

Suggestions

Instructional development and STEM education in our country in the framework of this study as a part of our programs in order to be benefited from the following suggestions can be made;

- Examination by teachers of different subject curriculum, the annual plan of-field teachers to be shared by. For example ; The school administrators merged on a weekly basis by creating annual plans to ensure all teachers know which other teachers upon issues in about a week.
- STEM activities developed can be applied for time-repeatable, can be accomplished with simple tools, complex tools required, like cheap-expensive basic classifications should be made and planned to happen in the way of obtaining them. For example, can be provided as a center, the city/county can be obtained on the basis of the with school's facilities can be provided .
- Universities, local authorities, NGOs and other institutions the establishment of cooperation with institutions that can be done. For example; establishment of science centers, STEM activities to be performed by the design of NGOs.
- STEM activities in the plan prior to the implementation in public schools and similar institutions TTKB approval and acceptance implementation.
- STEM activities by making them subject to registration and licensing of economic value creation,
- STEM education activity that are used in academic studies with learning objects on the identification of the plan by ensuring effective use of electronic media.

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