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Chapter 71: Developing Differentiated Computer Science Curricula for High School Learners

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Introduction

to From 2016, Saudi Arabia educational administrator launched of Vision 2030, which aimed develop curricula in line with global developments and informational updating. This will lead the learner into the future with new tools. Based on the principle of achieving sustainable developing computer development that is one of the goals of that vision, this calls for .curricula in accordance with the requirements of the labor market

In high school, we have two options of study: literary or scientific specialization. In the n the science literary specialization, students study language, psychology and history. I specialization, they study math, physics, biology and chemistry. However, there are general subjects in both fields that students must study such as English and Computer Science. such as programming and ,Actually, many topics in Computer Science are related to Math .networks. These topics are difficult for literary students since they are not studying math

From my observations in the United States and my own teaching experience as a teacher, I to begin with general technology topics: design the high school curriculums-suggest to re programming, web design, applications and security for their first high school year. For the second and third years, the students may select one of the areas for in depth study. This gives nity to choose the field they prefer for two levels in each year, which the students the opportu will better support students' learning interests and needs, and prepare them for university .major selection

resented a To summarize, in this proposal, I, as a Computer Science Teacher, have p comprehensive literature review, a possible solution to the problem, and a detailed implementation plan in the following sections. My proposal will help students to choose their ll finally prepare the majors and they will focus more time on one specific topic which wi .students for the university and their future career

Literature Review

The History of Computer Science Curriculum in Saudi Arabia

The Ministry of Education committed to the development of computer curriculum since it was first introduced into the secondary education program developed for boys in the the In the year 1991, technology curriculum was transferred to .(1986-school year (1985 secondary stage classes and the students studied in one class per week. Because the importance of spreading awareness and information culture, the National Family of the dating the recommended up (1996-Computer at the Ministry of Education (at the time) in (1995 previous books and curricula and increasing the hours prescribed for teaching computer subjects to two hours per week. Several years later The Ministry of Education decided to enter .s in 1995the computer curriculum in education Secondary Schools for girl

In 2001 the Ministry launched a "rehabilitation" project, which aims to qualify high school graduates in the fields of information technology in cooperation with the Saudi tracks, after which the year training project, and it has five-Computer Society, this is a two In 2008, the King Abdullah .student obtains an accredited certificate that qualifies him to work Project for the Development of General Education was launched in order to contribute to these students gained the values, knowledge and developing distinguished education. Through first century and to raised the competitiveness of the -skills that qualify them for the twenty Kingdom of Saudi Arabia. In order to increase knowledge in society through a set of programs, of which was the implementation of major programs for the development the most prominent of education to include: the continuous professional development of workers in education, the es development of curricula and learning materials. To achieve this, Tatweer Educational Servic Company was established in 2008 by Royal Decree to develop public education and to contribute to strengthening the efforts of the Ministry of Education in developing general op an Recently, the company sought to devel .education in the Kingdom of Saudi Arabia .integrated strategic plan for the curricula, including the computer curriculum in high school

The development of all nations is related to its educational system. Countries work to ntry. The achievement of the improve education in order to achieve the general goals of the cou desired outcomes are directly related to the educational curriculum that is used. Strong, effective curriculum is therefore necessary. Education enables the plans drawn for the ndividualized curriculum focusing on specific development and progress of society to unfold. I .tracks is one initiative that works towards developing the academic field of computer science

The Challenges for Students Learning in Computer Science

he development and The Kingdom of Saudi Arabia gives great importance to t promotion of education. In order to build a promising generation with diverse cultures based on solid education it worked on developing and building curricula to keep pace with the the student and develop it in line with The goal has been to prepare .times requirements of the first century. Other goals are to develop skills, and to keep pace -the requirements of the twenty .with the developments of intellectual, cognitive, technological and industrial developments

.cation development initiative in 2006The King launched an Edu

The project's goal is to increase Saudi Arabia's ability to compete and build :an educated society through a variety of programs, including

.Create an integrated system of standards of education, schedule, and accounting .

:Application of the Curriculum Development Program Head with five points

1) .Ongoing professional development for all those working in the education sector
2) .curricula and learning materials Development of
3) .enhancement of the educational environment in classrooms
4) .Use the IT to improve the learning process
5) .classroom events and student services-Develop non

onal curriculum that One of the objectives of the project is to develop an educati contributes to preparing an integrated technical generation, respecting science and the love for technology from an ethical and professional aspect. When looking especially at e curriculum should be divided developing a computer science curriculum in high school, th into four tracks acknowledging student's choices according to his/her preferences. This will .contribute effectively in preparing a creative technical generation loving for his work

d development of computer science in At KSA, the widespread acceptance and rapi publ ic, private, and corporate business areas by computer science has resulted in new, .interesting, a nd diverse opportunities for computer science graduates

Typically, most students admitted to higher education computer science departments have had no exposure to the concepts of computer science and computer science is a whole ,Nuaim 4, 2011) Consequently-new domain f or them. (Allinjawi, Krause2, Tang3, & AL this is reflective of the vast amount of information and programs that high school students receive in computer science curricula. Dividing computer science curricula into four paths rformance in the according to the student's preference helps to increase engagement and pe .classroom

Therefore, high school student learning outcomes will improve feedback and .creativity Many other parts of the world, including Europe, the UK (Burns, 2013) New Zealand, and Australia, have also reviewed and updated their curriculum requirements with .a view to increasing computer science / information content and rigor

me a global village due to technological advances. Any country The world has beco that is not profiting from science and technology will fall behind in training students to deal with future challenges. Computer science and information technology have become the s of those advances as certain countries work to provide students with quality main pillar education by building knowledge and understanding. It is important that he/she are part of a ,2healthy society and plays a role in improving the country and humanity (Malik1, Abid Kalaichelvi1, Bhatti, 2018). There is no doubt that the developments taking place in the world today in all fields called for many systems and governments to develop computer ccompany the science curricula to nurture the minds of generations with new concepts that a .paths of creativity and innovation that the future holds for them

The Four Sections for Computer Science Curriculum

Changes taking place in the world today across many fields demand that the er science curricula. These structures government develop structures to include comput focus on cultivating the minds of millennials with new concepts that complement the avenues of creativity and innovation that the future holds (Malik1, Abid2, R. Kalaichelvi1, .(Bhatti, 2018

ence pathways helps students that are passionate for High school computer sci programming. It is important that he/she chooses a programming path that suites a purpose for innovation based on their interests. This expands creativity and works with other paths Thus, when creating a generation capable of keeping pace with .that can be provided technological development, this improves countries in other fields. The tracks of computer :science proposed are as follows

Programming

ne of the fundamental With huge technological advances, programming is o sciences in the educational process. Learning various programming languages is important Jarrah, -for students to solve problems inside and outside of the classroom. According to Al languages are the main bases of Mafleh, AlRabee'a, and Gwaneh (2014), programming-Al computer use in the educational process. It is a set of intangible logical components that are generated, and -presented in the form of various educational materials that are computer thus providing immediate feedback to achieve ,interact with the learner and the teacher .specific goals

solving -Learning computer programming helps students develop problem skills (Alhassan, 2014, Shamma, 2014; Yousif, et. al, 2015; Major, 2010; Lee, 2014) and w computers and smart devices operate with software. gain a better understanding of ho Building off this foundation of acquired skills, students are able to learn more about the profession of computer science before making any informed decisions about majors in ve demonstrated that teaching high school programming universities. The authors ha solving skills" (Saeli1, Perrent1, Jochems1, & Zwaneveld2, -enhances students' problem" .(p. 83 ,2011

Web design

Due to the excessive use of the internet, Aswine (2018) alluded to a high demand ating websites in web design as a career. This career option is best for students who for cre f students who have have a good sense of designing and creativity. Given the large number o design talent, web design is needed as a pathway in the computer science curriculum. This is a specific pathway that allows students to learn more about detailed components that Students that are .nce classwould otherwise not get learned in a general computer scie passionate and interested in courses that enable them to design websites more effectively and creatively are more likely to have a deeper learning experience related to the .on to computer scienceprofessional world, than students who find no connecti

Applications

Muhammad Bashar (2018) noted that "applications programs [are] used effectively as a solving tool, or to clarify and interpret various study topics, such as word and text -problem rams "(p. 22). Some of the basic applications that processing programs, and graphic prog students learn in middle school are word processing, presentations, and spreadsheets. However, when students reach high school, modern application needs are synchronized with in order to rapidly develop the ability to use technology in a newly innovative applications deeper way. Learning different levels of applications open opportunities for students to .utilize other programming in a variety of settings

Cyber security

known as information technology security, involves As defined, "cybersecurity, also the protection of computers, networks, programs, and data from unauthorized or unintentional access, manipulation, or destruction" (Gecker, T. Atkinson, E. Adkins, H. Dillard, B. Holton, lson, & Wallace, 2017, p.8). High school students exposed to activities that V. Lodal, Jr., Wi ,Jin, Tu) solving experience greater levels of thinking-improve critical thinking and problem r anJin et al., (2018) further recognized the importance fo .(Kim, Heffron, White, 2018

innovative curriculum and pedagogical methods in the area of cybersecurity education” “ p.69). Cybersecurity courses at the high school level serves as a good proposition to ensure) ll learn about the that young people know the dangers posed by the Internet. Students wi concepts of cryptography, decryption and networks. More importantly, information security education will achieve far beyond privacy and prevent unwanted behavior (such as t are faced by young cyberbullying). Students will become more aware of new dangers tha people every day. Dangers such as fake emails and text messages, which appear real are ways to steal personal and financial information. This is the new direction for the Kingdom in .achieving Vision 2030

Conclusion

In conclusion, developing curricula with global developments and informational updating will help students learn new computer science skills. One of the goals of Vision 2030 is to achieve in accordance with the sustainable development, which is why developing computer curricula requirements of the labor market is important. In Saudi Arabia high schools, literacy and scientific specialization are the only two options under general computer science courses that he United States, courses fit to meet the interests students can take. Different from teaching in t :of students in the area. High school curriculums that offer general technology topics programming, web design, applications and security with help support students' learning .niversity major selection and careerneeds and prepare them for u

Through my teaching of computer science for high school, I have suffered from some students of literary specialization not understanding some topics of computer science because they are In this section, I .sics, and they are not studying these subjectsrelated to mathematics and phy designing the high school curriculums to four tracks, and how -provided a detailed plan on re .the students can select one of the areas for in depth study

Objectives	Description /Activities	Time frame
To graduate the stud from -F 1 the first year of high school and have a comprehensive and general idea of all computer tracks that will be presented to him in the second year of high school, and by determine this he will be able to .the track he desires it	The computer science curriculum for the first secondary school will consist of 4 chapters are: programming, application, design, cybersecurity in -web one book. The students graduate from the first secondary have a comprehensive view of all tracks so that he can choose the most appropriate track .for him	1.5 hours once a week .for 2 years
To graduate the students from -2 high school and are a professional in atechnological field of choice	The computer science curriculum in the secon secondary class will consist of 4 curricu namely:	1.5 hour once a week gn h .for one year la

	programming, application, desi cybersecurity. The -web student chooses t	
	curriculum that he prefers, stude moves to and when the the third secondary class he will b able to complete in the same curriculum that h chose .or choose another track :Role The teacher will explain the .curiculum	n

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