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RECEPTIVENESS OF EDUCATIONAL MULTIMEDIA TOOLS IN COMPUTER PROGRAMMING EDUCATION

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ABSTRACT: *Computer Science students face lots of difficult concepts while learning to program. To understand these concepts, students and teachers face challenges based on lots of factors such as course content, environment and/or miscellaneous of students learning styles. Computer technologies, such as educational multimedia tools, may or may not help to make these concepts more comprehensible. The author finds out the receptiveness of educational multimedia tools in computer programming education by survey. The result of questionnaire that given to computer science teachers and students at women's campus at King Abdul Aziz University finds a positive receptiveness of educational multimedia tools on computer programming education.*

KEYWORDS: Computer Science Education, Programming Course, Multimedia Educational tools, Animation.

INTRODUCTION

Programming skills are essential to computer science student. Students at King Abdul Aziz University (KAU) starting learn to program from the third semester and have to complete five levels in programming learning. Actually, they study basic programming concepts in C++ programming language at introduction to computer science course (CS101) while they gain a solid background in the fundamental areas of computer science. In an introduction to computer programming using C++ course (CS102), more programming concepts, problem solving methods and algorithm development are presented to computer science student. CS203 and CS204 courses introduce the object oriented programming to students while CS351, the last programming course, give them the principles of business programming. Therefore, teachers face a big challenge while they trying to present these programming concepts.

Programming psychologists study the appropriate methods that foster programming learning. They support that providing concrete models for basic operations of the language *explicitly* would facilitate learning (Sheil, 1981). Text, audio, graphic, animation, and video are different multimedia methods that may be used as assistant Educational tools to present concrete programming concepts that may help to present programming concept in the way students find it more comprehensible.

Educational Multimedia Tools

These educational multimedia tools that refer as Computer Aided Instruction (CAI) or Computer Aided Learning (CAL) tools are being increasingly used in computer Science Education (Rowe & Thorburn, 2000). They are powerful support tools for helping students to realize the behavior of a program by viewing graphical progress of programs or algorithms. (Ramadhan, 2000).

Indeed, Programming Education at KAU does not get the benefits of those tools. The use of Educational Multimedia tools is limited and it constructed using standard tools. Therefore, the author begins by measure the receptiveness of using those tools by get the opinion of teachers and students of computer science department at women's campus at KAU by using a questionnaire (see appendix A). The result of this research shows the positive receptiveness which give the researcher a positive motivation to do more researches to enhance the programming education through the educational multimedia tools.

Engagement Levels

The engagement taxonomy (Naps et al.,2003) identifies six form of learner engagement with visualization technology to provide a framework to lead empirical experiments that try to evaluate the instructional effectiveness of visualization. The six categories in the taxonomy are:

1. No viewing.
2. Viewing.
3. Responding.
4. Changing.
5. Constructing.
6. Presenting.

METHODOLOGY

The method used to get the outcomes of this research is using a questionnaire. This questionnaire measured the receptiveness of the teachers and students at computer science department at women's campus at KAU. They were the population of this study and the sample selected randomly. In fact, the sample was 3 teachers and 7 students.

The questionnaire itself was divided into 4 main categories. At first category, there are personal information about the age and occupation. The second was for teachers experiences, difficulties, and opinions. Students opinions was covered in the third category. Finally, the last category find out the opinions of the students and teachers about Educational Multimedia tools usage , students engagement level , its availability and Interface language.

RESULT

The questionnaire filled by 3 teachers whose age were between 28 and 33 years. And 7 students whose age were between 20 and 22. The experience of two teachers was between 6 and 10 years while one teacher had between 1 to 5 years of experience. Two teachers rarely face difficulties when they teach a computer science course at KAU while one of them faces difficulties sometimes as shown in diagram 1.

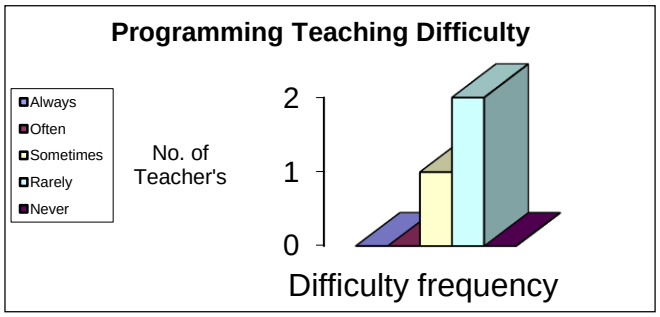

Figure 1. Frequency of programming teaching difficulty

From the teachers' respect view, the factors that affect programming learning are different. They evaluate the Students problem solving skills, Students analysis skills, Students ability to explain programming language syntax, Students ability to explain programming language semantics, Your ability to deal with varies of student learning styles, Programming environment clearness and finally, English language skills indifferent level. Figure 2 shows the rate of these factors from teachers' respect views.

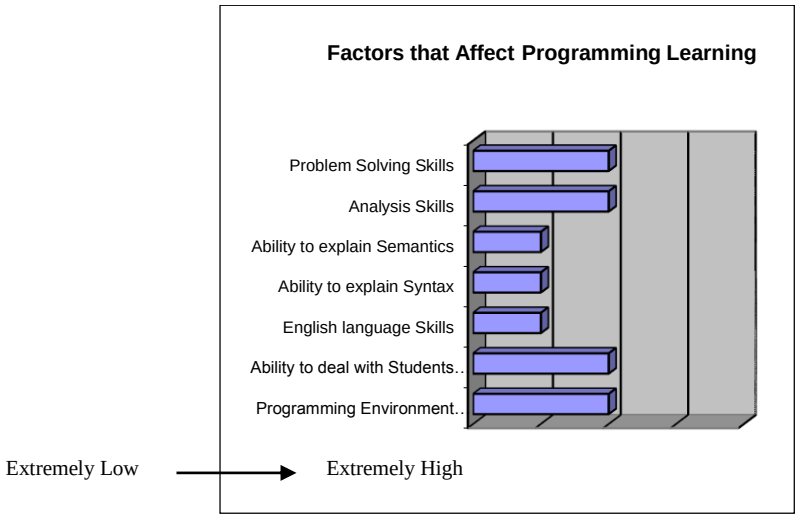

Figure 2. Factors that affect programming learning

The use of the Educational Multimedia tool based on the combining of one or more methods such as Text, audio, graphic, animation, and video. Some teacher use only text to present Information, practice, examples and exercises while other use a combination of text and animation to present program codes and combination of text, graphics and animation to present difficult concepts.

From experience of two teachers, the educational multimedia tools have always a positive effect on computer programming teaching while one teacher shows that the educational multimedia tools has a positive effect sometimes not always.
The advantages of using the educational multimedia tools are clarity, saving time, reusability, and readability. Some teachers show that the Less concentration and easy to forget some information are the disadvantages of using these tools.

Students who filled the questionnaire had different level of programming skills. Two of them were beginner who studying CS101 or CS102, four of them were low Intermediate who

studying CS 203, one of them was high Intermediate who studying CS204 and no advanced student who studying CS351 or higher filled any questionnaire.
They took different time to studying computer programming course weekly. Five students took 1 to 3 hours weekly while two of them took 5 to 7 hours weekly. The frequent usage of an extra resources that they use to comprehend computer programming concepts while they studying programming is different form student to another. Figure 3 shows this different.

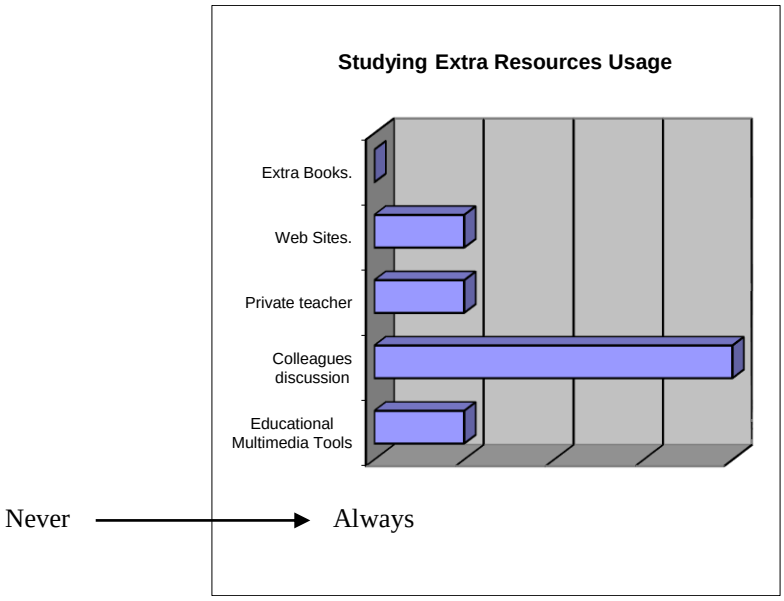

Figure 3. Usage of extra resources

Four of the student always comprehend the programming course through traditional face-to-face and white board teaching approach while two of them often comprehend through this approach but one of them sometimes comprehend.

The main points of this research is to find out the use of the educational multimedia tools receptiveness at computer science department at women's campus at KAU. The first question of the third category is measure it. Figure 4 shows the result in form of pie diagram. It show the positive receptiveness without any disagreeing from teachers and students.

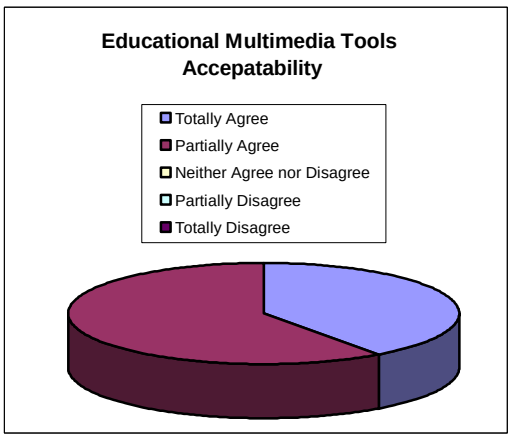

Figure 4. The receptiveness of Educational Multimedia Tools at Programming Education

The taxonomy of an engagement with Educational Multimedia tools identified by the working group on "improving the educational impact of algorithm visualization" that including six different forms of learner engagement with Educational Multimedia tool. It is the effect of the group observations about the different studies' results that does not prove the same expected result. By asking students and teachers about the suggested engagement level that they think it better for comprehending difficult programming concepts, they rating the responding level more than other levels. Figure 5 shows this choices in form of pie diagram for more clarity.

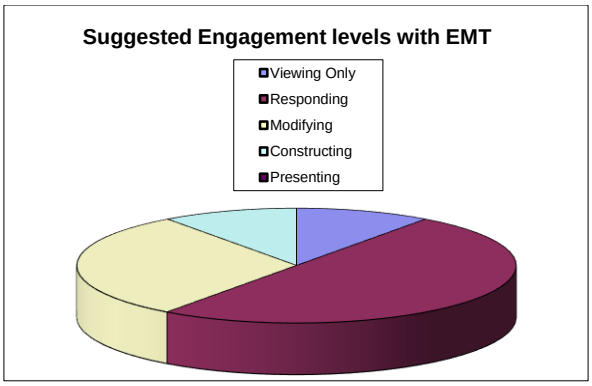

Figure 5. Suggested Engagement Levels

The subject of the research almost recommended to use the educational multimedia tool that present questions to students about the presented content to support high attention. Figure 6 illustrates that five of them strongly recommend the quizzes , two of them recommended it, one of them not sure and one of them not recommended to use the quizzes.

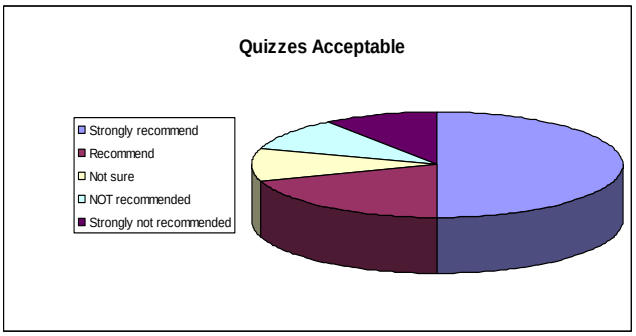

Figure 6. Quizzes Acceptability

Scoring these questions as a part of the overall course score to ensure serious attention is not sure choice for six subjects while two teaches recommended it and two students do not recommended it as shown in figure 7.

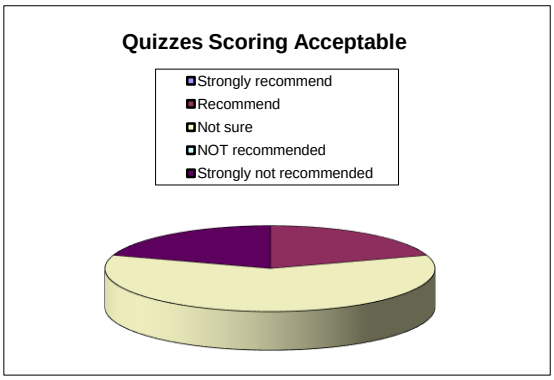

Figure 7. Quizzes Scoring Acceptability

As illustrated in figure 8, Subjects respond to the question about availability suggestions of the Educational Multimedia tools differently. No one suggest the availability at class only. Three subjects suggest the use of educational multimedia tool at class and labs while one of them suggests to use it at homes. The most of subjects (six) suggest to let the tool to be available at anywhere any time through the internet.

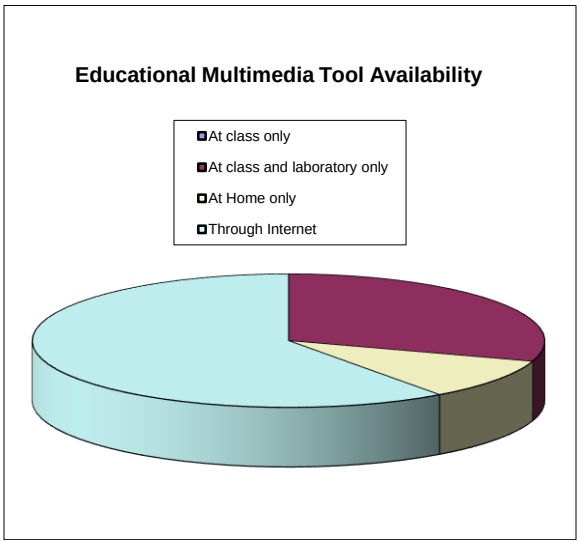

Figure 8. Educational Multimedia tool Availability

Subjects almost recommended bilingual Interface Language to be supported by the educational Multimedia tool system. One of them recommend to support English language only while two of them recommend to support Arabic Language as an interface language. Figure 9 give an idea about the percentage recommendation.

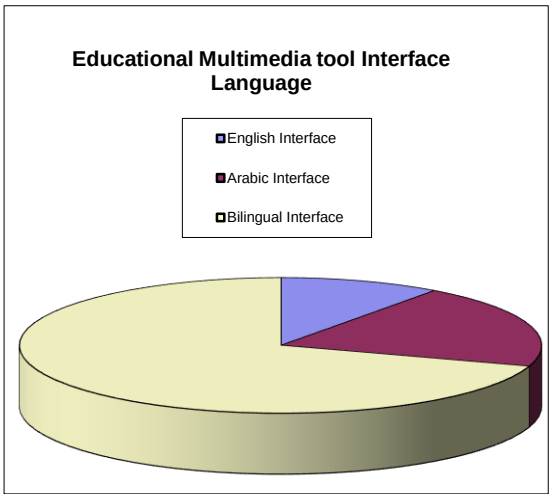

Figure 9. Interface language recommendation

Finally, the difficulties that may face the use of an educational multimedia tool in the classroom at women's campus at KAU are classified to many categories depends on the collected answers. Two subjects thought that the non-native language may be the most difficult that face the student while using the Educational Multimedia tool. Others notion the unacceptability of using new thing while other minimize the effect of this difficulty if they get helps to start using the tool. Some subjects think about time consuming, availability of such tools and cost of it as the difficulties that face the use of such tools.

DISCUSSION

This research find positive receptiveness of using multimedia tools at computer science department at women's campus at KAU. This outcome proved by direct and indirect questions. The benefits of using such tools appears in the opinion of both teachers and students.

In fact, this result found out the difficulties that face the use of Educational multimedia tools which help researcher to do more research to measure this difficulties by more accurate methods. This research was the beginning and it will give a motivation to do more research about using such tools. using those tools in reality and measure its effect on programming education will help to improve the education if we find positive effects.

CONCLUSION

Programming skills are important to Computer Science students who face lots of difficult concepts in programming courses. To understand these concepts, students and teachers may use educational multimedia tools as new computer technologies. By the end of this research, the author finds out positive receptiveness in computer programming education as a result of questionnaire that given to computer science teachers and students at women's campus at King Abdul Aziz University and they thought it as better tool to make these concepts more comprehensible.

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