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A Review on Computer Systems in Learning

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***Abstract*: In this paper, attainability of computer algebra based math frameworks is examined, which are all the more generally utilized in science and engineering fields. Students take up by compiler projects as a part of their learning curriculum. Common characteristics of computer algebra systems forming the foundations of these systems are discussed in brief. Software tools with the purpose of teaching mathematical concepts are evaluated and their usage is reviewed. We will also be discussing about the application of computer systems in learning and the Artificial Intelligence in computers in learning.**

***Keywords*: Software aided mathematics, computer algebra, computer aided learning, artificial intelligence.**

1. Introduction

By the development in the visual aids supporting the modern computers, a greater goal can be achieved in transferring information through vision using computers. Taking advantage of this, greater results are intended in the matters of education, as the requirements to achieve this increased result are met by computer support. Despite the fact that they have a numerical hypothetical foundation, PCs were utilized just to explain issues looked in territories which were appropriate to scientific demonstration, for example, in designing, science and economy through numerical calculation techniques. Utilization of computers as an instructive material proficiently, when we consider the time frame of the advancements in science has only begun recently. The cause of that are not the enhancements in recent hardware or new methods emerging in the theories that form the logic of the computation, because computers are machines that are built according to binary digit system designed in 1854.

It is vital for a computer, whose point is to do math or instruct math, to be in a human-style approach by methods for showing math in a computer-aided route in each dimension. Else, the PC may just be utilized as a show device and this circumstance will render PC wasteful regarding human-computer communication. Epita is a private organization which teaches science of computers to students and emphasis on projects to implement learning. It follows a three phase schedule including theory components, core curriculum, and specialization respectively. In order to achieve the stated goals, we first need to construct a Computer Aided Learning (CAL) system which reflects all the retrievable benefits. To develop these models, we can partially use the concepts of Artificial Intelligence.

2. Models of learning

There are many acceptable models of learning. Each of these models or each subset of these models are followed by many people, but here we will discuss only about three models. These three models ae highlighted here because, Over the decade, these are the models on which the important principle of ‘computers in learning’ is based. The first model was proposed by Gagne (1970). In his model, he has listed out eight types of learning. They are:

- Signal Learning (Classical conditioning)
- Stimulus-Response Learning
- Chaining
- Verbal Association
- Discrimination Learning
- Concept Learning
- Rule Learning
- Problem Solving

This order follows the hierarchy also. It can be said that these symbolizes the levels of learning in an abstract manner. For instance, response learning which happens in second type, can only be achieved if the signal learning is done, i.e. we have learn to identify the signal in order to give out the response. The second model laid out by Pask (1976) talks about subject matter analysis. The resultant structures will be shown to the student and the can pick a path which suits them. These two models and similar cognitive models were majorly employed in building a type of CAI (Computer Assisted Instruction) software called Courseware produced in the 1970’s.

The third and final model in our discussion subset is based on the works of Holt (1977), Plaget (1972, 1980), Papert (1980) and few others and is majorly referred to as Discovery learning. It is based on the premise that learning is a natural activity. The will to learn should come within the learner and this ideology has also influenced Courseware and has led to the creation of computer languages like LOGO.

3. Functions supported by computers in learning

These are the different functionalities we can imply using the environment and support computers offer.

- *Computer Managed Learning (CML):* This is about the softwares used in administrative task usually required by instructors.
- *Computer Assisted Instruction (CAI):* This refers to

delivery of training material via computer.

- *Computer Based Training (CBT):* This is where both CML and CAI are combined with other training media for the purpose training peers for a particular job.

4. Systems for computer algebra

The calculations utilized in numerical techniques, as well as fundamental number juggling tasks, incorporate more complex tasks, for example, figuring numerical values of scientific capacities, discovering foundations of polynomials, explaining initial-value and boundary-value problems, numerical combination and registering eigenvalues and eigenvectors of grids. Another such field is symbolic computation, that is, computer algebra. Computer Algebra math frameworks for the most part are created such that they will likewise understand the procedure of developing the information into information.

5. Computer-aided teaching of mathematics

The job of computers in mathematics teaching, in 90s, has expanded after the examinations that stress significance of visuality. A study favoring this is was made by Dreyfus [1] which highlighted the computer as a cognitive tool. The convenience and unwavering quality of computer algebra frameworks which is a standout amongst the most significant periods of computer-aided mathematics has been at the highest point of the most contended issues in this field since the early long periods of 90s.

Kajler and Soiffer [2], in their examinations in which they inspected Maple, Mathematica, Macsyma and MathCAD programming regarding "human-computer communication", they owned a ton of expressions identified with the possibility of computer variable based math frameworks in educating. As per them, the most significant preferences of these frameworks are that they can give the yields exceptionally near textbook style that they lean toward representative outlines of reasonable numbers or unreasonable numbers, for example, pi.

Crowe and Zand, in the first [3] of their series of articles they published pertaining to the role of computers in university level mathematics teaching. They clarified the difference between didactic software and mathematics software by classifying in such a manner. Adding on to this, an example of Sutherland's [4] study using Excel, a spreadsheet program by Microsoft, to teach his students the fundamentals of algebra may be given. He made use of the software Logo to teach the concept of "variable"; however, this software is in the category of "mathematics software" of the classification.

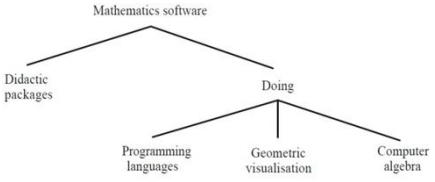

Fig. 1. Mathematics software classification

The spreadsheet program, which we can put into general bundles group, on account of their formula highlights, can proficiently be utilized in instructing fundamental ideas, for example, decimal rounding or demonstrating essential logarithmic values, or in demonstrating the connection between the formal meanings of ideas and their visual segments. Applications which empower drawing designs dependent on information and which is additionally one of the general highlights of these product will be a proficient device in illustrating essential function graphics. A brief demo was conducted to show this feature of spreadsheets as a teaching tool for computer algebra.

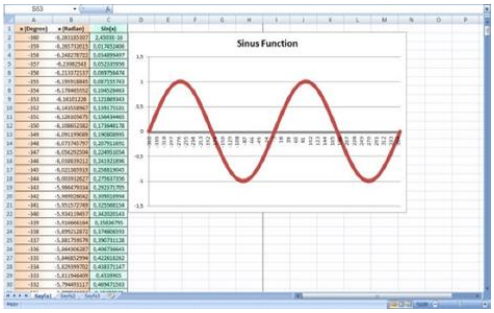

Fig. 2. Sinus function

Computer algebra systems' educational usage can be assumed in two different ways. First, "tutors" that are made using software that don't require much skill to utilize the software. An important part of the tutorship comprises of special interfaces created for the users. This user-friendly interface will allow the student to concentrate on the subject instead of dealing with the complex construction of the software. On the other hand, direct usage of the software provides a broader aspect. But, it will be inevitable that the user must possess some knowledge in some subjects

Crowe and Zand [6] believe that computer algebra systems bear an essential role in teaching and learning. As a support to their argument, they offer the article of Stoutmeyer [5] which emphasizes the didactic benefits of computer algebra systems formulated at a time when the PC's had not yet become ubiquitous. They draw attention to the fact that both mathematicians and mathematics teachers tend to use computers today more than ever, and one of the most used tools by them is those that help in visualizing algebraic functions.

The main roles of students working of projects are:
Complete project
Team management
C++
Object oriented Design and Design Patterns
English
Time management etc.
We learn to understand the following aspects:
What is a compiler, which language is use.
It uses the Tiger books project as its bases for learning procedural c language, functions of ML, OO of JAVA.

In addition to meeting thr goals the compiler has to perform the following task:

- Never repeat itself.
- Be reasonably dimentional
- Be easy to debug
- Be easy to check
- Be extremely modular
- Follow students in their c++ learning

6. Artificial intelligence in computer in learning

As we can use AI only partially in implementing computerized systems in learning, it is employed only on a small scale.

AI Techniques for CAL includes:

- Using more number of experts to create a data base of knowledge in a discipline.
- Cumulatively feeding the feedback to the system by students. This can be used in further improvisations using concepts of reinforcement.
- Building models suitable to each individual by considering the individual input, thus fulfilling the need of individual attention.

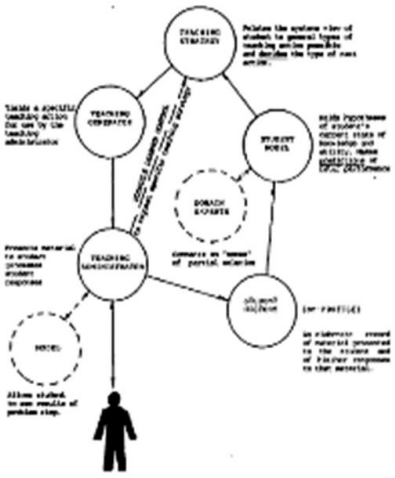

Fig. 3. 5-Component Module designed by O'SHEA for Intelligent Computer Tutor

As the O'shea's model is difficult and expensive to both build and maintain and it implies the condition that subject area chosen for instruction must be well structured, so far there are no systems built on this model.

7. Discussion and conclusion

As a result, the computer algebra based math frameworks today have turned into a significant advance of computer support which is to be connected particularly to undergrad level science instruction and it appears that their jobs in this territory will acquire even more significance soon. Notwithstanding this, because of the expansion in their plausibility, they have come to a range comprising of a more extensive age gathering, in this way they have begun to show up as an instructive apparatus in essential and optional training.

These frameworks' abilities in calculation are apparent; moreover, because of its highlights of planning interfaces, they will be unavoidable materials for arithmetic teachers just as mathematicians.

The Tiger project implemented by the students of the EPITA society help them have good C++ programming skills and know the principle design patterns, help them not to hesitate to implement complex algorithms or to use an auxiliary tools, pay attention to documentation and tests, and help them understand how compilers work. This is the result of hard work, and regular hauls under the student criticisms. Even though the first class suffered from many defects, the majority of them refer to Tiger as the project that taught them the most. We have seen why a compiler construction project is relevant to a core curriculum. We have emphasized a few key aspects of the design such a long project should contain, and their impact on student involvement. We also propose an abstract guideline for similar projects.

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