CHAPTER II

REVIEW OF RELATED LITERATURE

*Automatic Assessment of Programming Assignment*

In today’s world study of computer’s language is more important. Effective and good programming skills are need full all computer science students. They can be master in programming, only through intensive exercise practices. Due to day by day increasing number of students in the class, the assessment of programming exercises leads to extensive workload for teacher/instructor, particularly if it has to be carried out manually (Gupta, S., Dubey, S.K., 2012).

Developing an automatic assessment system for programming assignments, using verification program with random inputs. One of the most important properties of a program is that, it carries out its intended function. The intended function of a program or part of a program can be verified by using inverse function’s verification program. For checking intended functionality and evaluation of a program, we have used verification program. This assessment system has been tested on basic C programming courses, and results shows that it can work well in basic programming exercises, with some initial promising results (Gupta, S., Dubey, S.K., 2012).

There are three actors working in this system: Teacher, Student and System. First, Teacher will provide programming problems (which are presented descriptive to student) and verification program. The programming problem will descriptive to student and verification program is hidden. Later when student visits the system, he can try to solve these problems. The works submitted by student is then assessed by System. The stochastic information of system, such as common errors or error of program, number of input, number of time run will store in system’s database, which can helps teacher to evaluate the performance of the students and whole course (Gupta, S., Dubey, S.K., 2012).

The Automatic assessment system automatically compiles and runs the students program and evaluate on the basis of verification program. The system in this paper has been implemented in a Computer class based on basic programming concepts. There were 90 students in class and 81 students submitted their assignments. The assessment of the assignment is done by this system. In this system 81 students assignments evaluated, in which there was 20% compilation error, 25% incorrect programs and rest of 55% programs is resulting correct as per result of system. This system gives the result of assessment in less effort and provides all information regarding programming assessment (Gupta, S., Dubey, S.K., 2012).

The system has some constraints, like student have to write a program which takes input only form command line argument and format of output should be in predefined format. In future these constraints can we remove to make system more user friendly. Till now this system can’t we say as fully automated, in future by enhancing this system, we can make this, fully online and automatic which can be use from anywhere through internet (Gupta, S., Dubey, S.K., 2012).

*Designing Programming Exercises with Computer Assisted Instruction*

Learning computer programming has been known to be difficult for many beginners (Boulay, 1989). A number of challenges have been identified for both teaching and learning programming (Sleeman, 1986). A programming course typically has a large class size. Large class size is one of the major barriers to effective instruction. It is difficult to closely monitor individual student’s learning progress. The teachers do not have enough time to interact with all students in a class of hundreds of students within a few hours of lectures and tutorials each week. Teaching and learning computer programming has created significant difficulties to both teacher and students. It has been showed that computer-assisted instruction (CAI) technology can be a more effective way of teaching introductory programming courses (Anderson & Skwarecki, 1986). This paper will share our experience in using CAI technology to teach computer programming with large class size (Wang, F.L., Wong, T.L., 2008).

Instant support to the students is a critical factor to the success of teaching and learning of computer programming. However, it introduces a huge pressure in the resources, and it may not be affordable by some universities. It has been showed that intelligent computer-assisted instruction technology can be a more effective way of teaching introductory computer programming courses (Anderson & Skwarecki, 1986).

The system allows the teachers to setup some programming problems. The teachers provide the input and the corresponding output to each test case. The students then submit their program for testing. The system automatically complies and executes the program submitted. By comparing the outputs generated by the students’ program and the expected output provided by the teachers, the system will then provide feedbacks to the students(Wang, F.L., Wong, T.L., 2008).

*On the Didactic Principles , Models and E-Learning*

The educational process is based on pedagogy – the methods used for teaching and learning, and the ‘teaching objects’ in a course, such as assignments, learning activities, objectives, prerequisites, etc. There are three options for any learning technology when it comes to model didactic approaches: pedagogy-neutral (supporting no pedagogy at all), pedagogy-standard (supporting a single pedagogy) and pedagogy-driven (supporting a diversity of pedagogy). A great part of the contemporary software tools and technologies in the e-learning field can be characterized as subject-dependent (reorganized for specific fields and users) and pedagogically neutral (they don’t support or provide any kind of methodical strategies and more specifically they don’t specify ways for interpretation of learning content and objectives that are dependent on other conditions). They are ‘neutral’ especially in relation of the logic of interpreting of the course content while no learning requirements are specified.

On the other hand, there are hundreds of different pedagogical models and strategies. As recorded by many authors: learning is different from consuming content learning and the implementation of one pedagogical model/strategy is not the right direction for e-learning researches and standardization. For example, the course may consist entirely of activities without any learning content and thus its transfer to a ‘pedagogy-neutral’ or ‘pedagogy-standard system would be difficult.

The paper is presented a project for development of a virtual learning environment, named BEST1. The BEST architecture focuses on the following concepts: learning is an goal-directed process; learners may define their own learning objectives, monitor and regulate their own learning process; learning is embedded in a social context; principles of collaborative learning; assessments and tasks are both product knowledge driven.

The contemporary e-learning courses are purposed mainly not to present the pure scientific knowledge, but to solve vocational training tasks. The main criterion for the choice of the taught knowledge is its applicability to specific professional tasks. As a result, there is a transition in the process of creation of the course learning content – it is not based on the subject principle. In the same time the requirements to the educational methods and forms are significantly changed as well as to the preparation of the teachers for their new role in the teaching/ learning process. For example, various individual and group learning activities (working with learning materials and information) become predominant. The nature of the relationship teacher-learner during the learning process is vastly changed together with their typical behavior.

The importance of universal (methodical) knowledge for assessment and prognosis of the future is increasing.

The requirements to educational organization methods and forms and in particular to the preparation of the educators for their new role in this process are changed significantly. Individual and group forms of active work with the learning materials and information become predominant. The type of activities performed by educators and learners is vastly changed together with the nature of the relation between them during the learning process.

There is a tendency for the learner to become a full-fledge subject during the process of solving learning and professional tasks – with the support and collaboration of the educator.

*Computer Aided Instruction to Teach Concepts in Education*

21st century education is entirely different from the classical education. Education now a day is accompanied by technology. Hence, schools without computer technology has considered lame. This study assessed the effectiveness of computer aided instruction towards students behavior and achievements in Mathematics. This study used a quasi-experimental method of research. The researcher assigned a group using traditional teaching and learning, and a group of respondents using computer-aided instruction. The data obtained were analyzed using weighed mean, standard deviation and T-test and it was tested at 5% level of significance two-tailed test if there exist a performance mean difference between the Traditional learning and teaching and CAI used in the group of respondents. This present research work is a critical evaluation to determine the effectiveness of CAI as alternatives instructional methods in teaching. This study will help educators to consider using an alternative delivery mode of teaching in meeting the desired outcomes. Results have shown that CAI is meeting the expected learning outcomes and it shows the more promising effect in terms of effective teaching in the multiplicative skill multiplying two-to three-digit numbers by one digit number to the grade three students while in multiplicative skill solving routine and non-routine word problems both traditional approach in learning, and CAI are effective in teaching the students. Through this, the teachers should use CAI in teaching. To address, issues and concerns, the school should have a training workshop on how to use the computer during presenting the lesson by power point presentations (Suson, R., & Ermac, E. (2020)..

*Online Learning Management System*

With the rapid development of computer science and technology, Computer Aided Instruction(CAI) has being playing a more crucial role in modern teaching management and education itself. While in the teaching modules related to the art of programming, the position of human graders can be well taken by automated programming assignments graders such as Online Judge(OJ). At present, a large proportion of universities and institutions have adopted OJ program which were developed by themselves in programming modules, which leads to huge cost of human resources in its development and maintenance. In this paper, the author proposed an online teaching management system, also called Tsinghua University Online Judger(THUOJ), which is public and universities oriented, to address the above issue. Besides some basic management functions, the system mainly focuses on the programming assignment grading and program assessment customization for varies programming courses, which makes the system be suitable for diversities between different modules and can provide personalized programming grading services. In this article, the author made his design according to the potential users of the system, and proposed a design of the system's structure on the basis of the frame using Linux+Apache+MySQL+PHP(LAMP). Especially, the author adopted C and PHP to program the online judge module. Finally, there is a simple website demo has been implemented on the basis of OJ module, in order to demonstrate the usage of proposed system and online judge module (Zheng, N., Tian, S., & Chen, Y. (2016)).

*COMES: A CAI System Oriented to Programming Languages*

COMES, a system for computer aided instruction oriented to programming languages, is described here. The system allows a full integration of theory learning and practical applications since it offers two different teaching strategies, one corresponding to a purely tutorial environment and one to a programming and problem-solving environment that has to be specialized for a given programming language. Thus, the learning process can be based on a tight alternation of theory and practice and relies more on personal experience than on memorization of abstract information. The main design choices are discussed in the paper and two examples of dialogues are supplied (Manzo, M. D., et.al. (1978).

*Synthesis*

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|  | Enrollment | Content Based Module | Performance Tracking | Assessment | Chat bot | Video Conferencing |
| Automatic Assessment of Programming Assignment | ✓ |  |  | ✓ |  |  |
| Designing Programming Exercises with Computer Assisted Instruction |  | ✓ | ✓ | ✓ |  |  |
| On the Didactic Principles , Models and E-Learning |  |  |  |  |  |  |
| Computer Aided Instruction to Teach Concepts in Education |  | ✓ |  | ✓ |  |  |
| Online Learning Management System |  | ✓ |  | ✓ |  | ✓ |
| COMES: A CAI System Oriented to Programming Languages |  | ✓ | ✓ | ✓ | ✓ |  |
| Computer Aided Instruction using  Natural Language Processing Algorithm | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |