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Developing a Model for Improving Dynamic Student Intelligent Tutoring System

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ABSTRACT: Developing a model for improving dynamic student intelligent tutoring system is a work centered on modeling a teaching and learning system that integrates feedback mechanism. As education system has been drawing much attention over decades, due to the important role education plays in nation development, the traditional education system has fallen short of what is required today, coupled with the decrease in learning standard in Nigeria has motivated for the necessity to develop a model that will enable student to learn base on their proficiencies. Currently, teaching in any kind of education, consists of a teacher given materials to students, and it will be discussed in the classroom with students. Their also occur e-learning platforms where students can study virtual. However, these learning methods have unsuccessful handle the challenges in learning abilities of many students they presumed that all scholars are equal. These issues inspired more for this research in other to find an intelligent control mechanism for vigorously exhibiting the students learning speed according to their interactive patterns. The aim is to prototype a system for enlightening dynamic scholar, the intelligent coaching system that will assimilate students learning model. The methodologies used to achieve this, is an expert system model, object oriented analysis and design methodology cum neural fuzzy logic. The system can distinguish the student category and make decision on suitable course content from repository of knowledge base that will match the learner. The performance of the intelligent tutoring system was tested to know the level of accuracy in determining student-learning speed. The expected result meets the standard and it was displayed.

KEYWORDS: Dynamic student, E- learning, Intelligent Tutor, Neural Fuzzy, Patterns, Model, Expert system

I. INTRODUCTION

The education system has attracted a lot of attention for decades due to the important role of education in nation building. The traditional education system has not met today's requirements. Especially in this time of Covid-19 pandemic, Boko Haram, Bandits, IPOB, herdsmen, Unknown Gunmen and other Social and Political Crimes. Technological developments over time have shown that they can play a key role in changing the narrative by offering technological tools to digitally advance the education system. The spread of audiovisual aid gadgets has made it easy to quickly create collaborating hypermedia E books that can reach many educational institutions and students far and wide. Intelligent gadget equipment has huge prospective in the field of replication molding, especially in combination with cybernetic Technology. The Creation teaching aids echoes the technological progresses in today's world. This technology provides a powerful avenue of showcasing interactive teaching and is used as a teaching material that can support learning. New technologies subsidizing to education and training include ITS (Intelligent tutoring System), educational game systems and interactive training simulation systems. Multimedia presentations are used as teaching material during the tutorials and to enhance the learning content of the tutorials.

Initially, some media such as CDs or the web were used as a medium for e-learning. The types of instructional material are static, unintelligent, and inflexible; the content is the same for all users. This is because the course topic was organized using the previous methodology and then different students were trained in the same style with no change in style or content. The diversity of students, especially in terms of learning ability, speed and interest, means that this approach reduces the effectiveness of the learning style. Therefore, it is important that the learning system is dynamic and intelligent, as an experienced educator can adjust the order of lessons and the pace of training according to the abilities and characteristics of the student.

The Intelligent Guidance System (ITS) is an adaptive learning environment that provides tailored instruction based on the individual needs and abilities of students (Murray, 2017). ITS tends to be more advanced than traditional computer-based training.

II. RELATED WORKS

This work integrates three areas of research that contribute to the design and implementation of the intelligent tutoring system, namely Intelligent Tutoring Systems, Human Computer Interaction (HCI), and Mobile Learning disciplines [2]. A smart tutoring system chosen as a platform to build on, because of its ability to improve student learning. The Mobile HCI field contributes to an understanding of how to design applications that make user-friendly experiences. The field of Mobile Learning contributes to an understanding of how to integrate mobile learning applications into existing classroom settings.

Theoretical Framework

The smart teaching system in ELearning as a knowledge process will make sense if the technology in used is fully phased out and the users of the technology are phoned as they learn. These concepts highlight the learning process and the importance of the term "m-learning". **Traxler [10]** Other M-learning advocates define m-learning as wireless and digital tools and technology, developed by the student and used by the student while participating in higher education. Others define and define m-learning by paying close attention to student movement and learning movement, and the experiences of students learning through mobile devices.

[10] Writes: "M-learning is therefore not 'mobile' or 'learning', as previously understood, but part of a new mobile understanding of society. Research and reflection on e-learning should promote multidisciplinary and interdisciplinary thinking and methods in education. They should facilitate our understanding of outdated concepts and rigid assumptions about learning and what it can be in a society that has changed into the unknown (at least from a technological perspective) in recent decades.

They stated that there are several definitions and insights about mobile education, which only focus on technology and hardware, whether it is handheld and mobile devices. This definition undermines the understanding of the use of cellular technology in learning by limiting statements and descriptions to the actual physical way the technology works.

Review of Existing Literature

Hsu in their work offers a personalized advice system on the mobile learning process; to enhance the reading of English students as a Foreign Language (EFL). In this way, a mobile learning process that provides reading instructional materials to support students is developed. The experimental evaluation process performed in three groups (two experimental groups, and one control group) showed that the systemic instructional approach improved students' learning experiences **[6]**.

[3] Provides an impressive recent work on the role of Artificial Intelligence to provide effective learning methods for online learning including e-Learning as well as m-Learning such as the recent changes in the popularity of mobile devices. After a brief overview of adaptive learning / intelligence, the study focuses on software design, and m-Learning complete information system design methods.

In their work, **[5]** **Provides** an adaptation based on m-Learning, an intelligent teacher, which also has the structure of Expert Systems. The system is generally a cognitive teacher that includes three working modes: pre-test, conceptual, and post-test, which are applied to the student's personality. It was stated in the work that the system is good at improving the quality of education significantly and reducing costs.

[12] Designed and developed an intelligent system used to teach the basics of mathematics; via Android-based PCs and mobile devices. In this sense, the system uses various components such as social learning network environment, intelligent tutoring system and emotion recognition. In detail, the system has a Neural-Phase system for identifying the student's emotions and a Fuzzy Logic system for monitoring the student's pedagogical states..

[11] Provided outstanding work on the approach of energy efficient clustering inspired by bio to enhance the user experience in M-learning. In this regard, the authors inspired an artificial bee colony (ABC) algorithm to introduce a new clustering protocol called BeeCup. At the moment, BeeCup is used to save energy on mobile devices while

ensuring the quality of the learning process. In short, this study gives a different view of providing intelligent m-learning in that it will not directly affect the learning materials themselves. Still, it's a great thing to have ideas about the current and future state of the literature.

[18] Introduced M-Learning model based on multidisciplinary sensitivity monitoring and how to deliver learning resources tailored to the needs of students. [7] A work in 2015 is a recent review of trends and approaches related to intelligent teaching programs and focuses on mathematical assessment in the global context. Because this study explores mobile applications and features in the sense of modern intelligent learning methods, it is a remarkable indicator of having ideas for the future of M-Learning.

The use and integration of artificial intelligence (AI) techniques in various educational disciplines such as Face-to-Face, Distance Learning, E-Learning, M-Learning has been extensively researched and researched in recent years. Among the many ideas of researchers is to improve education through mobile learning and to integrate mobile learning with AI to make learning and teaching easier for the student and teacher in the educational environment.

[1] Introduced the practical implementation of a multi-user technology laboratory that includes Artificial Intelligence (AI) and Bluetooth (BT) techniques. Their aim was to create an m-learning environment where students could work in a customized way. **Fadzil** [4] discussed that although the application of AI is not fully integrated in education, the Open University of Malaysia (OUM) sees many areas that could benefit from it, in terms of quality assurance, the improvement of the pedagogical approach as well as the improvement of the general. Teaching and learning experience.

[9] spoke about the predictable deterioration of education standards because unqualified workers dominate throughout the education industry. This opened the way for them to explore the need for an expert system to create a pleasant learning environment for students that has a positive impact on their learning outcomes. The study was conducted in 2010 with students of Bindura University of Science Education doing module-Introduction to Computer Science..

III. METHODOLOGY

The research methodology employed in the design of the new system, was Expert System Model and object Oriented Analysis and Design (OOAD) Methodology. Expert systems are interactive computer programs that mimic and automate the decision-making and reasoning processes of human experts in solving a specific domain problem, through delivering expert advice, answering questions, and justifying their conclusions,

It consists of three main phases as shown in below.

Phase I: Identification Phase, we identified Information systems problem situations and classified them into four types:

- (1) Technical problem situation;
- (2) Social problem situation;
- (3) Socio-technical problem situation; and
- (4) Complex problem situation.

Phase II: Determination Phase: Here a group of suitable types of Information System Development Technology ISDMs were selected based on clarity and stability of user requirements, development time, familiarity with technology system complexity, and system criticality.

Phase III: Selection Phase: A specific methodology selected, based on the objectives and goals of each methodology.

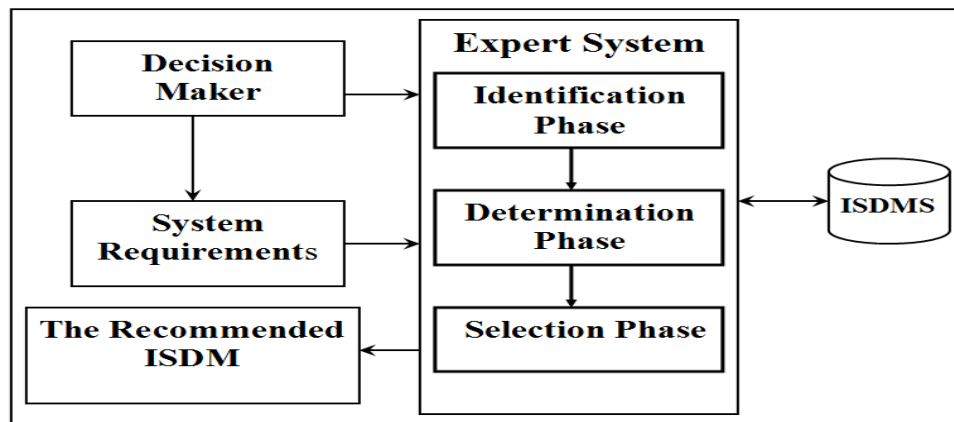


Figure 1: Expert System Framework

Analysis of the Proposed System

This work developed a model of the system that identifies the process, the reference value and the control. Modifying that cybernetic model according to the didactic principles of an individual instruction, the idea of expert systems, as well as the methods and techniques of knowledge presentation, enabled us to develop a model of an authoring shell for implementing the intelligent tutoring systems (ITSs). We have model the system to become more adaptable to the process of student's knowledge and skill acquisition.

The control process for the tutoring system developed further to elaborate how it applied to student tutoring system. The input quantity represents the student knowledge state before embarking on the tutor. The process is the modeled knowledge for acquisitions. Output quantity is the student knowledge state after the knowledge acquisition. Governing actuation is the knowledge test for the student, etc. the dynamic model control process further developed to a full tutoring system model and represented.

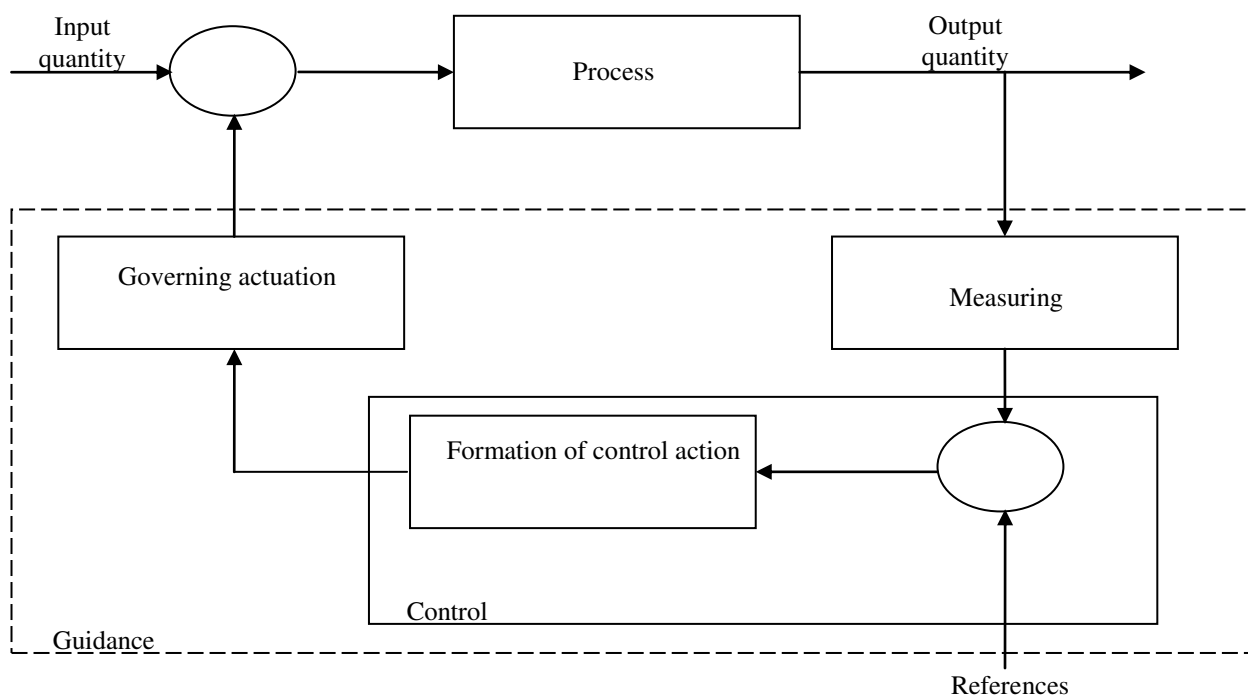


Figure 2: Dynamic model control process

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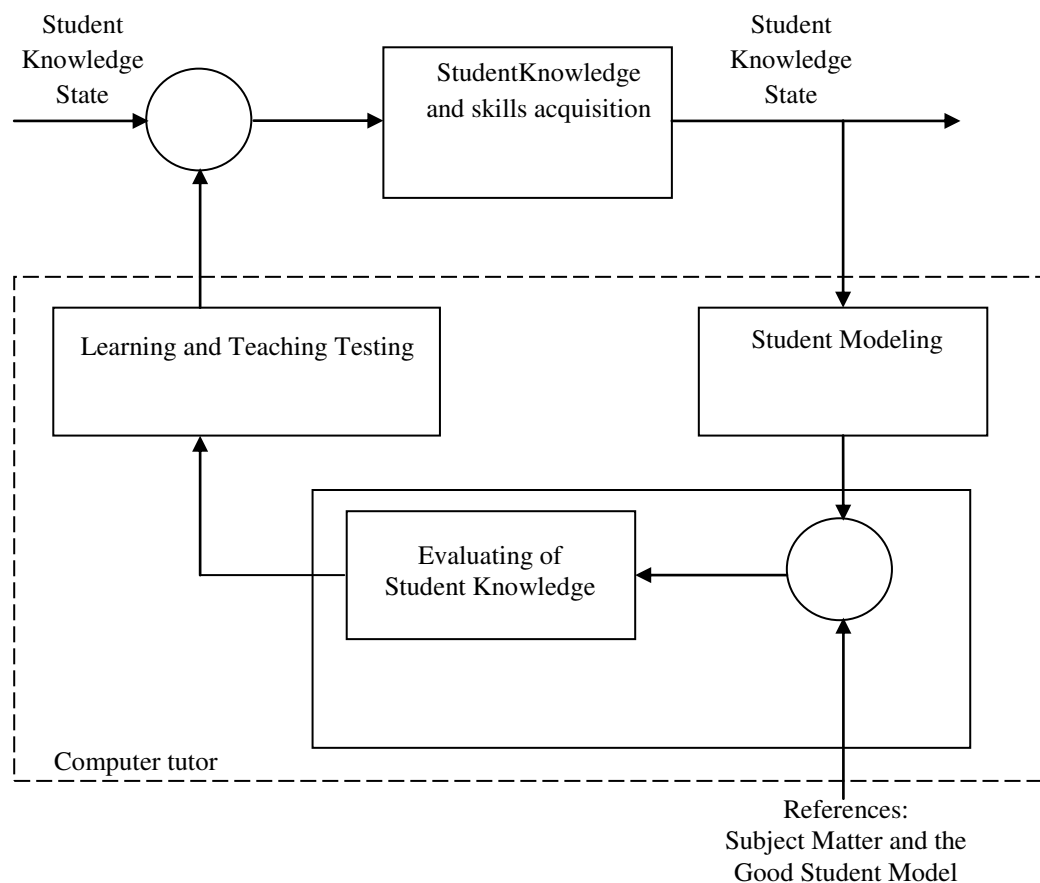


Figure.3: Model for intelligent tutoring system

The student's knowledge state is a manageable input and an output value of the process, regarding the actual subject matter unit of domain knowledge. The process in the intelligent tutoring model is the student's knowledge and skill acquisition. The referent value (reference) defined through:

- i. goals and tasks of the subject matter, which need to be understood and
- ii. the "good" student's model based on the evaluation criteria that implicates the cognition of the specified student's knowledge level.
- iii. The computer tutor, as a replacement for a "human" tutor, gives feedback in our model and has to:
- iv. build the student's model and diagnose the student's knowledge (student modeling,
- v. determine differences between the actual student's knowledge and the referent model, as well as manage the activities' states (evaluating student's knowledge) and
- vi. Shift the learning and teaching to the next element of the subject matter (learning and teaching) or perform remedial teaching (learning and teaching) and start testing (testing).

SYSTEM ARCHITECTURE

The intelligent tutoring system architecture considered to have four major components: expert model, instructional model, learner model, and user interface.

High Level Model of the Proposed System

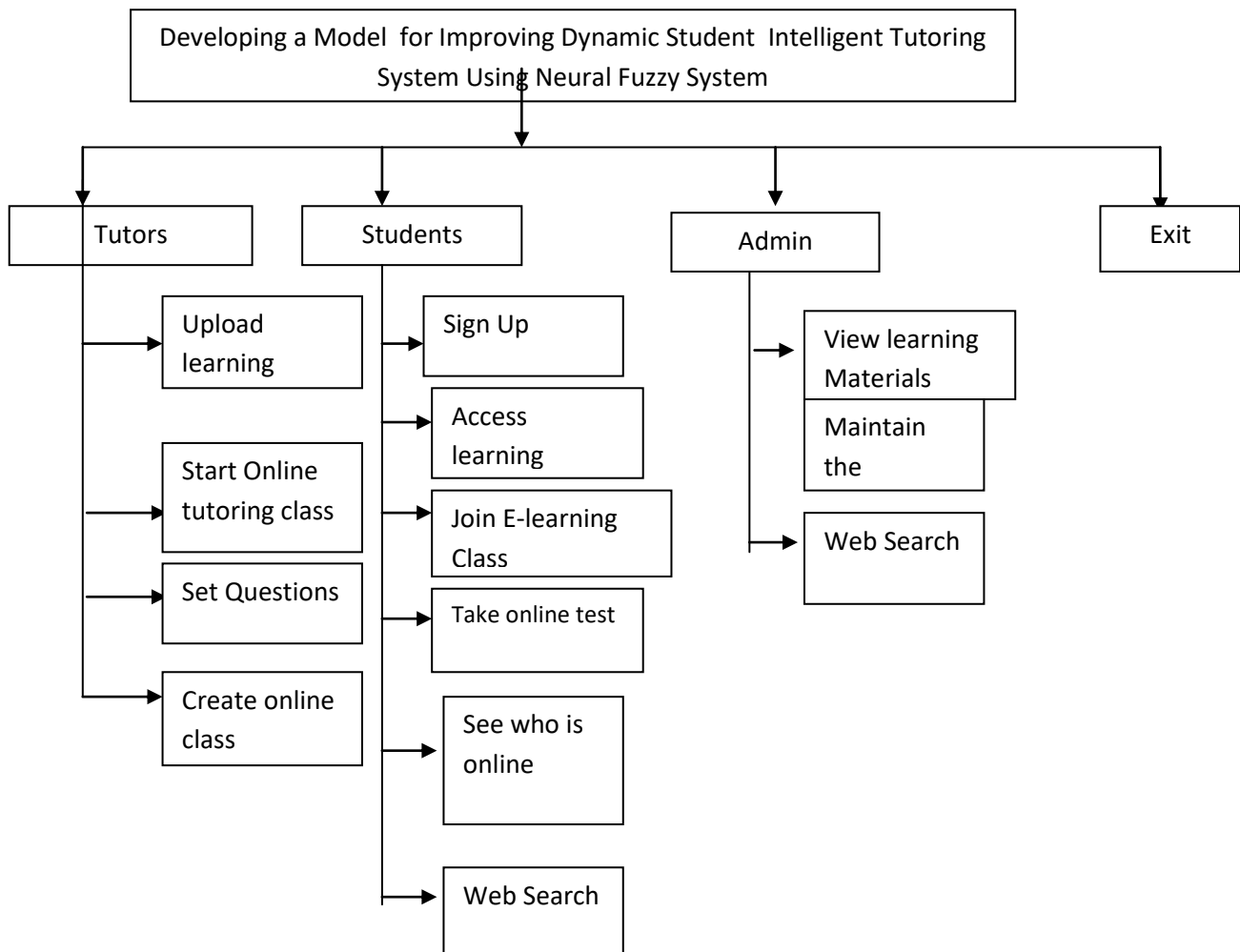


Fig 4: Proposed High Level Model of DSITS

IV. CONCLUSION

The goal of intelligent tutoring system is to help student to build a cognitive model for learning. In order to accomplish this goal, a tutoring system has to: (i) build learning contents; (ii) determine from student's behavior on what they know and misunderstanding; (iii) interrupt student's work when his choice leads to errors; (iii) give help on student's demand; (iv) verify correctness of student's answers; (v) estimate student's knowledge and skill and advise what he /she should do and when they should proceed to new material. The knowledge contained in knowledge base, as well as, programming tasks are universal, and the system has to adapt to selected course of study.

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