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UML System Model to Implement Authentic Learning in the 21st Century

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***Abstract* — The Pandemic situation demanded all universities to transform towards online teaching and learning as an alternative to face-to-face study through Technology Enabled Learning (TEL). In most developing countries, universities use Learning Management Systems (LMS) such as Moodle and Blackboard to facilitate online education. The LMS is used mainly to facilitate staff, administration, and students sharing module outlines, specifications, lecture schedules, lesson plans, assignment generation and submission, announcements, and generating assessment reports. However, it has been observed that many inefficiencies exist in the teaching and learning approaches as there is less focus on learner autonomy. Dynamic changes in the world and drastic transformations demand continuous learning and innovative thinking. Authentic learning is an approach that focuses on real-world situations to gain new knowledge and skills in a context rather than listening to lectures and memorizing information. In authentication learning, enabling collaborative learning has been observed as a practical approach to developing critical thinking, reflective thinking, and enhancing creativity. Sri Lankan culture is inherited with authentic learning as our cultural events, traditions, and values encourage living in harmony and learning from each other. This paper proposes a new system as a web portal to ensure that the learner can effectively gain the required knowledge, skills, and attitudes to face complex real-world situations, thus arriving at practical solutions to overcome contemporary issues. The proposed system focuses particularly on distance learning programs, as those could be advanced by the adoption of a model that can be used to guide the design of online learning environments focused on elements of authentic learning. In addition to presenting the authentic task model and its theoretical functionalities, the authors have implanted Bloom's Taxonomy Theory to ensure the quality and effectiveness of the system model. Researchers have incorporated use case diagrams and activity diagrams to exemplify the UML model.**

Keywords- Authentic Learning, Online Education, UML

I. INTRODUCTION

Education is the process of imparting knowledge, values, skills and attitudes, which can be beneficial to an individual, and learning is the process of adopting knowledge, values and skills. Sustaining a nation's development is inextricably linked to the country's level of education.
Thus, the government's focus on educating their citizens is a key focus area as competing in the global workforce is a key concern. The world needs people with the skills to grow in the 21st century, and employers look for potential innovativeness and creativity as key criteria. Combined with technologies that continue to develop rapidly, the result is a world that needs continuous learning and development.

Thus, this education and learning are eventually considered one of society's fundamental demands. Technological advancements are a must to facilitate an authentic learning approach for distance learning programs.

Creativity, critical thinking, collaboration, and communication are the 4Cs that represent the skills in demand in the 21st century. They are largely excluded from our educational system and thus do not appear on most examinations. Sri Lanka ranked 106 out of 139 countries in the world for creativity.

The World Exports of Creative Goods in 2015 totaled the massive US $ 509 billion. According to Global Creativity, Sri Lanka could only capture 0.04 per cent of this revenue.
Index [2]

The learning environment should compromise high-speed internet connection and bandwidth, provision of multimedia information, asynchronous and synchronous communication and social networking tools to support teamwork, intelligent tutoring systems, virtual laboratories, feedback mechanisms, and mobile devices for accessing and inputting data during field-based investigations.

Research on distance education has been conducted for many years and continues today to investigate the use of online technologies to enhance and support learner activity and engagement.

The proposed system will contribute towards overcoming the existing inefficiencies in the traditional paper-based evaluation systems and will focus more on learning through real-life scenarios. One key to success appears to lie in the design of learning environments that effectively use the communications capabilities of technologies that can connect learners in meaningful ways [3].

II. OBJECTIVES

The main goal of this software is to implement authentic learning, and it was designed in a way that a student self-evaluates. The student's profile will indicate that learning achievement level aligns with bloom's taxonomy framework. The software focuses on incorporating game-based learning to evaluate the learner where the levels will be defined based on bloom's taxonomy framework, remember, understand, apply, analyse, evaluate and create. Artificial intelligence will enable game-based learning and help adsorb complex phenomena in an exciting mechanism, ensuring the quality of education the goal through a web-based software application.

III. IMPLEMENTATION OF AUTHENTIC LEARNING ELEMENTS IN THE SYSTEM

The researchers have implemented the authentic learning elements to map the tools in the pre-system as a new model. The following table (Table 1-Learning design mapped against the elements of authentic learning/components) illustrates how the elements of authentic learning have been addressed in the learning design of living and learning with technology, highlighting the characteristics of authentic activities.

The proposed system is designed based on the systematic investigations of authentic learning by examining successful, in-depth online authentic learning practices, including in-class complex tasks and evaluation approaches.

It was identified that the complexity of the task led to bringing out innovative solutions and their application to real-life situations. Exploring working examples and critical [1] analysis led to effective experiences for both the learner and the facilitator. The following table illustrates how the elements of authentic learning have been addressed in the learning design of Living and learning with technology. Table 1 shows the learning design mapped against the elements of authentic learning as components of the system.

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Table 1. Learning design mapped against the nine elements of authentic learning.

Authentic Learning Elements	**Characteristics of Authentic Activities**
Authentic Context	• A design to preserve the complexity of real-world settings. • It gives learnings a sense of purpose and motivation. • In the context of a real-world situation, ideas can be explored in depth.
Authentic Activates	• It is defined by clear goals and relevance to real-world situations. • By authorizing knowledge production rather than preproduction, it is necessary to prioritize knowledge production over preproduction. • Students must decide how they will make decisions about how they decide they will complete the task.
Access to Expert Performances	• Provide students with access to expert thinking and processes. • Students should see how an expert think and behaves and how they move around in the environment and what they do when performing the task. • Sharing of narrative stories.
Multiple Perspectives	• Students who are capable of utilizing and exploring issues from various perspectives and capable of enhancing a variety of learning resources and materials, not just a single textbook.
Collaboration	• Provide joint problem solving and social support. • The learning environment can provide it by arranging students into teams or pairs rather than as individuals. • Encourage through technology task address to groups rather than to an individual.
Reflection	• The learning environment provides an opportunity for the students to think about, reflect and discuss choices. • Students compare their thoughts and ideas to express, teachers, students and other students.

Articulation	• The learning environment provides opportunities for students to express themselves verbally and visually about their gowns and understanding. • This allows students to present their work in front of a public, defending skill sets and ideas.
Coaching and Scaffolding	• In an authentic learning environment, the teacher's scaffolding role means no attempt to transmit knowledge. Instead, the teacher's role is to be supportive rather than a detective. • Teachers are not always in charge of the activities; sometimes, more capable partners can assist. • A teacher, guide, or helper is on hand to provide contextualized support.
Authentic Assessment	• Teachers and facilitators should be able to integrate the assessment with the task. This means that what they assess is generally a very polished kind of product, and usually, it has taken significant time and effort to collaborate with other students. It is important to align the tasks with the assessment so that the teacher can seamlessly integrate them.

The following table illustrates how the elements of authentic learning have been addressed in main activities within the system, the relationship with each as component widgets. Authentic tasks form the core of an authentic learning environment. The completion of these tasks is what the students put most of their time and effort into during the unit [4] [5]

Table 2. Shows the Main Widgets in the system mapped against is each task and the relationship between authentic learning.

Widgets of the System	**Task Description**
Webinars	• Opportunities to learn from others through access to various levels of expertise Lectures and expert guest lectures Optional peer review Open education and custom-made internet resources.
Discussion forum	• Teachers can create discussion boards to encourage students to think critically about their unit work and interact with each other's ideas. • The teacher must first create one or more forums before users can start message threads. A forum is where participants discuss a topic or a group of related topics.
Collaborative Learning	• Real-time video conferencing tool with file sharing, apps, and virtual whiteboard. discussion.
Quiz- (Mapping with the bloom's taxonomy rubrics remembering, understanding, applying, analyzing, evaluating)	• Based on the curriculum built in the software, the student is progressively challenged to remember, understand, apply it, and analyze by themselves. • Find and create gamified quizzes and interactive lessons to keep any learner interested and involved.
Storyboarding- The Projects are close to students' own life.	• Each student expresses their ideas, experience, and interests, thus enabling creative technics.
Flash cards	• Contain exciting facts about the subjects being studied; students can add images, words, phrases, or numbers to test themselves on the subject being studied quickly. • If learners prefer, they can search our database for an image that matches the card.
Online Video	• Learners have unlimited access to the system's high- quality, up-to-date, and engaging video tutorials. Automatically suggest videos based on the unit they are currently studying. • Video courses are presented in bite-size chunks. It is simple to locate quick answers to specific questions.
Games- Action games eg:Doom	• Creativity and innovative thinking-By brainstorming new game ideas. • An opportunity to push students' skills further and demonstrate students, newfound skills as developers and creative thinkers. • Categories students' thinking skills, ranging from recalling and evaluating students by themself in an interactive way.
My Library	• The system's libraries provide a variety of services and facilities to students and staff. • Connecting and collaborating with peers and supervisors via technology and experimenting with new platforms and applications. • The service is designed to provide just-in-time assistance when users are unsure what to do or where to click to resolve to learn technology issues as they arise and get back to work.
Turnitin	• Maintaining academic integrity. • Providing instructors with software that streamlines

	manual grading processes will allow them to devote more time to teaching. • Help students develop their original thinking skills by providing high-quality, actionable feedback that is easy to incorporate into their teachers' existing workflows.

The interface comprises two leading portals. One is a student, and the other is a staff. The system enables easy access to both students and teachers and allows customization. Fig. 1 shows the staff portal, and fig. 2 and fig.3 show the student preview of the system.
The overall images illustrate the interface of the system. The system has different widgets different to a Moodle as it enables the learner to self-evaluate themselves through game-based learning aligned with Bloom's taxonomy framework.
The learner will be receiving badges and star points which will indicate the level of achievement. This way, they will evaluate their current level and the level they need to reach along with the tasks they need to complete.

The unique feature of the proposed system as it enables the learning more interesting, fun and enjoyable activity in a way that they also interact with others when it comes to game playing. Depending on the subject context, there will be games designed to take part as teams. This learning approach will also create so that those failures face in interactive tools and games and the successes are informative. The learner will learn from the losses or poor points and be motivated to excel in their learning journey.

When this approach is applied in an educational context, learners can be presented with challenging problems, requiring participation from multiple players around realistic scientific concepts. The system also enables a personalized experience sharing their ideas, expertise and interests through the storyboard widget, as storytelling is a way of bridging the generation gap and forming the foundation to understand the future better. The author has observed authentic learning as a practical approach to effective life-long learning.

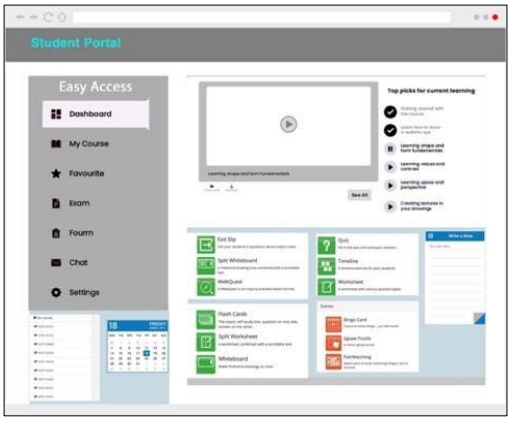

Fig. 1 Interface of the system Stuff Portal

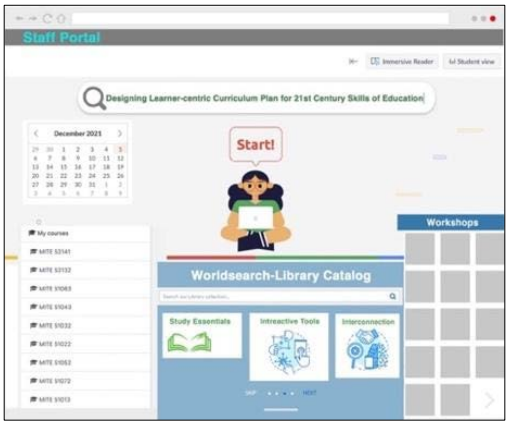

Fig. 2 Interface of the system Student Portal

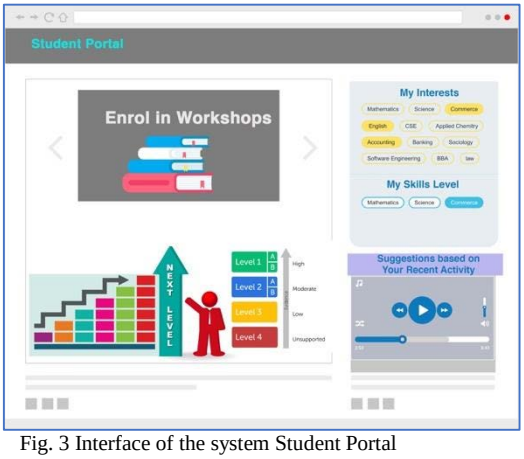

Fig. 3 Interface of the system Student Portal

This interface has easy access as the widget system has forums, chat options, links with open educational resources, whiteboard management, and different widgets as education components, including quizzes, timelines, worksheets. Worksheets will keep track of activities and enable the learner to evaluate themselves through refractive analysis. The facilitator will only guide the students. The widgets also include top ticks for current learning. This widget will pop up links to different sources and references aligned with the learner's interests and will motivate and engage learners in the interested study arena.

There will be action-based games such as Doom. Action games and These strategy games will enable the learner to self-evaluate and assess his or her levels. In Bloom's Taxonomy, the evaluation level is where students judge the value of ideas, items, materials, and more. Evaluation is the final level of Bloom's taxonomy pyramid. At this level, students are expected to bring in all they have learned to make informed and sound material evaluations. In the meantime, they can evaluate their mapping to Bloom's taxonomy frame. Fig.3 image Also, exercise-based games such as drawer mind mapping exercises will assist the learner in thinking creatively and selecting effective.

IV. SYSTEM FUNCTIONAL VIEW

UML stands for Unified Modelling Language, which is diagrams capable of accurately describing a system from various perspectives. Each view consists of diagrams illustrating various aspects of the system [6]. Within this system, the functional and dynamic views of the system are presented and explained. In this paper, the author will discuss how two distinct types of UML diagrams can be used to depict the functional view of a system. Use Case diagrams and activity diagrams created based on the system's predefined functional requirements.

A. Use Case Diagram

The use cases diagram the system's functional requirements. The use case illustrates the interactions between the system's various components. In the use case diagram, the actor represents a system component.
It reflects the functions of the user or application required to interact or communicate with the primary use case of the system. The proposed system has two main actors: teachers and students who interact directly with the system. Widgets and their functions are components of our system.

Use Case Diagrams are created to ensure that each actor has the appropriate access to the relevant components.
To create the Use Case Diagram of the defined system in the paper. The functional requirements for the system were determined, as shown in
Fig. 4. Use Case diagrams were developed to show learner and staff activities' significant processes.

Use Case diagram helps model the system's functional requirements and features the flow of events [7]. It is essential to mention the main scenario, alternative scenario and actors involved with the use case when writing the Use Case description [8], [9].
As in the system, one of the mains follows can be described as the system prompting the teacher to log in with the proper credentials. Then the system validates the ID and password. after that teacher can successfully access the staff portal of the system and access the functions for staff.

B. Activity Diagram

Activity Diagrams describe how activities are coordinated to provide a service at different levels of abstraction. Typically, an event needs to be achieved by some operations, mainly where the operation is intended to perform several different things that require coordination, or how the events in a single-use case relate to one another, most use cases where activities may overlap and require coordination. Activity Diagrams describe how activities are coordinated to provide a service at different levels of abstraction. [10]

Activity diagrams, the objects needed to execute the functional requirements are identified. Furthermore, the responses taking place during the execution are clarified. can conclude that activity diagrams describe the system's functionality from a sequential aspect [11]

In this system, fig.5. shows the important processes of creating a quiz within the system. The user initiates the system by entering their login credentials then the system validates the user's ID and password. Then the based on that system verifies the user enter into the portal. According to the potential, the user has different system features. Furthermore, process notification management and updating notification process was defined in fig. 6 as activity diagrams.

Fig. 4 Use Case Diagram of main Actros's and system response

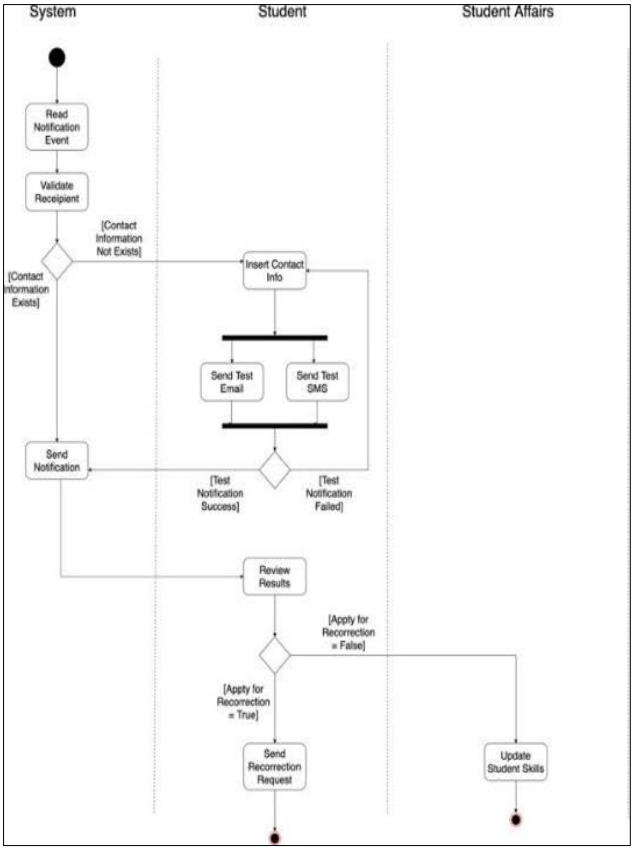

Fig. 5 Activity Diagram of Notification Management

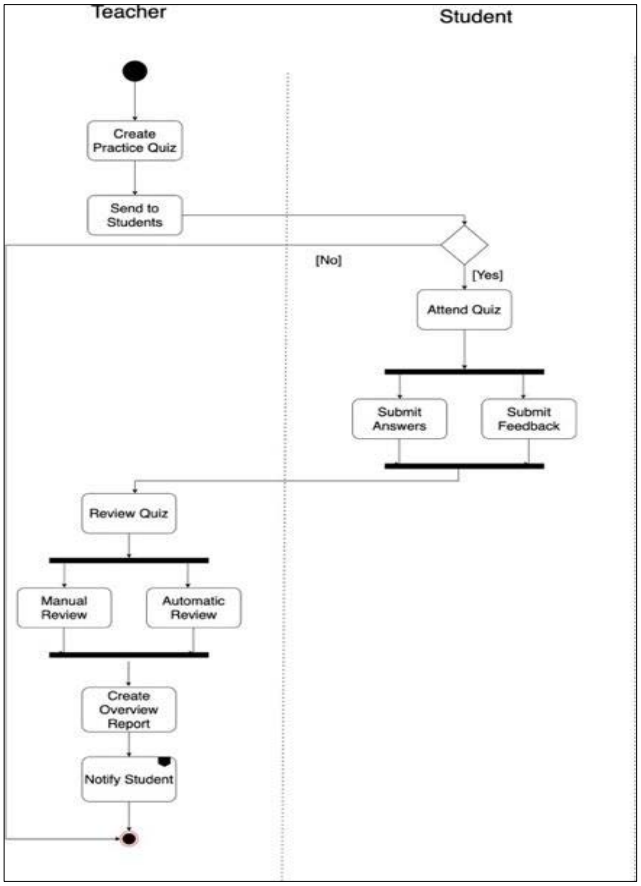

Fig. 6. Activity diagram of Quiz Crating Pro

V. CONCLUSION

The proposed system is observed to significantly contribute to enhancing the teaching and learning approaches, overcoming the inefficiencies prevailing in the contemporary education system. Implementing the proposed system will bring positive change, transforming the educational system, enabling new thinking and new ways of learning aligned with the drastic dynamic technological changes resulting in the world. Thus, bringing innovation and creative lifelong learning is possible. Learning with Technology has attempted to prepare teachers for rapidly changing technological advancements.

The approach has been observed through literature to enhance students' knowledge and skills and promote self-directed learning and 21st- century learning skills. Students formulate Technology in a real scenario. This proposed system is an expert system typically composed of at least three primary components: inference engine, the knowledge base, and the User interface.

As the proposed system has micro components, the following can be identified as future directions. Software development life cycle (SDLC) is a series of phases the software will be realized and developed from an understanding of the concept. The iterative Incremental Model can be identified as the model going to align for the proposed system. Incremental development model helps to develop the software architecture and processes, overcoming the drawbacks of the waterfall model. [12]

In the interactive incremental model, as the initial phase, a partial implementation of the proposed system will be constructed as a deliverable phase and phase to phase increased functionality will be incorporated. Based on the actors' feedback, who are the key users of the system, if there are any defects or errors from the prior delivery, they will be fixed, and the working system will be delivered. This process will be repeated as a cycle of phases until the entire system development is completed. These repetitive processes are referred to as interactions, and at the end of each scenario, a system increment is delivered. Iterative, incremental development means improvements are made ongoing, so the result is likely to be delivered on time and of higher quality.

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