Construction of a Framework for Selecting an Effective Learning Procedure in the School-Level Sector of Online Teaching Informatics

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Abstract

Currently, there is no way soon to stop the coronavirus epidemic that has spread over the globe. People are alarmed by its quick and widespread expansion. COVID-19's transmission chain was then broken by everyone. There was a gradual decrease in social and physical closeness. Distancing yourself from others is a way to prevent the transmission of disease. The purpose of this research is to investigate how online learning can be implemented in Tamil Nadu, India, during the COVID-19 epidemic. This research works focuses to find efficient learning procedure in eLearning protocols. The findings indicated that Google Classroom, WhatsApp, and Zoom Clouds Meeting were consecutively the most commonly utilized programs to help in remote learning. Despite this, most instructors continue to use the learning paradigm while teaching in virtual environments. Online learning and remote education are the most common methods of learning. The instructor claims that the learning model used is beneficial to their work in creating a virtual classroom since it adheres to the model's structured grammar. The experimental test has been conducted with 125 students who anonymously filled out a questionnaire and voted for more visual based eLearning. The findings show that students in distance education believed that there were more tasks than in face-to-face education. At the same time, students indicated that they spent more time studying at home than in school.

Keywords: Online education, informatics, e-learning, Google classroom, distance education

1. Introduction

A significant portion of the educational process now uses various types of eLearning that make use of information technology. It makes no difference what kind of educational

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institution provides the training: universities, schools, or small training firms. Therefore, information technology is utilised to support any kind of knowledge delivery, including completely online universities or programmes, distance or blended learning programmes or courses, face-to-face lectures or classes, and massive open online courses [1, 2].

In the event of a pandemic, education should not stop. However, the rest of the world has not yet been prepared for what is about to happen. As a result of COVID, the use of remote learning as a teaching method has become more widespread, particularly at universities. Since most schools were forced to discontinue face-to-face instruction because of the COVID epidemic [2], online learning has become the sole available option for students at all grade levels. Since March 11, 2020, all schools in India have been shut down. Hence, the lecturers in informatics mostly use many media based video applications to administrate, submit, hand in work, and communicate with students [3–8].

There are great challenges faced by the students in studying where the learning is through face-to-face and distance mode with the help of media application. Technology has permeated almost every part of our lives, from how we work to how we communicate, to how we transform data into information, how we analyse and distribute that information, how we amuse ourselves, and even how we spend our vacation. This is the latest stage in the development of the Internet, which includes e-mail, e-commerce, government, and education. How we teach and learn is evolving as a result of the rise of e-education, or online education. The pace and magnitude of change in educational delivery paradigms has been tremendous [9-12].

Researchers, educators, administrators, politicians, publishers, and corporations are all interested in the changing education environment as institutions globally adjust to these developments. Rather than the "correspondence" classes that began in England in the mid-nineteenth century, e-education allows for asynchronous and synchronous education delivery methods, as well as access to online discussion boards, chat rooms, and video conferencing. In the 1990s, with the development of the Internet and the World Wide Web, "online" or "blended" learning became a reality for people who wanted the ease of not having to go to class.

Even though schools have been closed for more than two months, teaching and learning have continued at home. Students and teachers may both benefit from working remotely. Non-classical or remote learning is taking the place of traditionally dominant classical education.

Students enrolled in distance education programs, need to be able to communicate with educators. There are a large variety of learning aids that automatically adapt to many parameters, including student characteristics, student learning independence, the nature of the topic, the availability of IT or supporting facilities, and other considerations. Despite the fact that distance learning is not a new phenomenon, it is vital to have a minimal amount of preparation for this process due to the sudden choice to work from home and study from home. An online education is a delivery method that makes use of computers and the Internet to provide students with educational and learning information that can be accessed online [13-15].

Further, this research paper is divided into many parts. Section 2 summarizes previous research in the field of online education informatics. Section 3 provides an effective online teaching informatics learning approach. Section 4 outlines the outcomes of the planned effort. Finally, section 5 summarizes the online teaching protocol's efficient learning approach.

2. Literature Survey

Ma et al., explained in detail how software packages with tutoring capabilities might become popular using intelligent tutoring systems. Using these teaching strategies, you may deliver the information, ask questions, assign learning activities, provide feedback or recommendations, and engage in discourse with students [16].

TeSLA's assessment activities include quizzes, forum participation, blog notes, learning diaries, oral presentations, game or simulation tasks, role-play tasks, and more. Okada et al., proposed a variety of assessment activities that may be reviewed using the TeSLA system [17].

Sangara et al., point out that it is difficult to encompass all the aspects of eLearning in a single definition, but they believe that it may be seen as an organic progression of remote learning, which has always made use of the most recent tools to emerge in the area of organized education-related technology [18].

Another study indicated that students' physics inventiveness improved when using project-based learning and virtual media. The experiment class saw a greater rise in inventiveness than the control class. In all areas, verbal and figurative inventiveness grew. However, verbal creativity surpassed figurative creativity in terms of growth [19].

It was suggested by Burgos et al., in their study that adaptive learning techniques might be developed inside a single educational unit to accomplish individualized learning by altering the user interface, instructional flow, or content items based on how well the learner performs [20].

2.1 Research Gap

Few essentials questions regarding eLearning are answered here.

1. Do students believe that the number of duties and the amount of time spent on home preparation during the COVID-19 epidemic were equivalent to those before the quarantine? Their study career is questionable without efficient learning sectors even through online mode education.

2. How did they feel at the time of the COVID-19 pandemic spread both physically and mentally during online class? Every one of the students is attentive to the core of the subject through online mode education conducted by school for their syllabus.

3. Methodologies

3.1 Constructive learning process

Complex human activities such as learning and teaching do not have clear descriptions of how students should learn and how teachers should educate. Instead, various ideas focus on how students and teachers learn and grow. Students' individual traits and the features of the learning environment are taken into consideration when developing ideas about how they will process and manage information throughout their time in school [21-26]. Figure 1 shows the overall proposed visualization based learning frameworks. The learner's behaviour changes as a result of incoming stimuli and the teacher's knowledge transfer, which is described as behaviourism.

Cognitivism: The idea that a student's developing conduct is linked to his or her evolving mental processes.

Constructivism: It is a theory that holds that the knowledge is constructed by students in response to the materials and experiences they encounter in the classroom.

Active Learning: It is important for students to actively participate in the learning process by interacting with other students.

Social Learning: The learner's conduct changes as a consequence of seeing or experiencing the behaviour of others while they are learning. In a real-time smart learning environment, students are taught using both online and face-to-face methods.

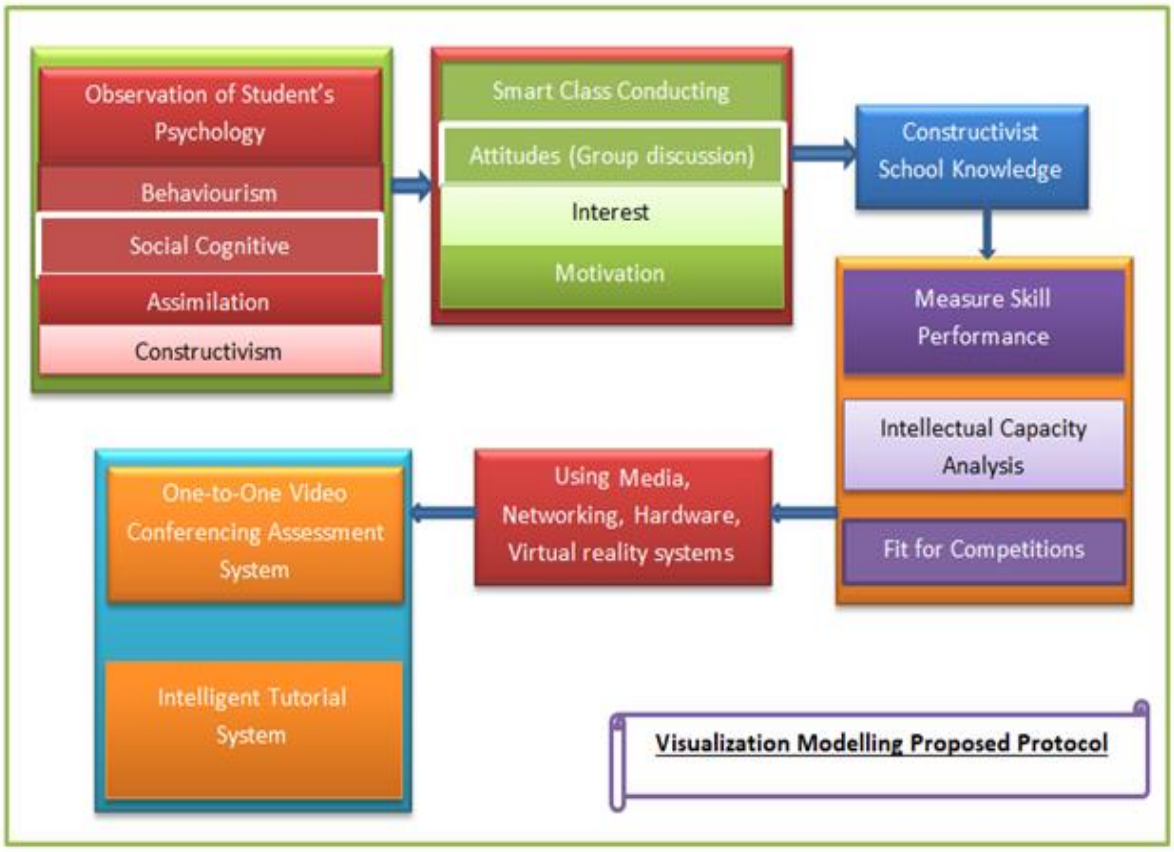

Figure 1. Constructive eLearning procedure through more visualization

3.2 Proposed eLearning procedure

During the COVID-19 epidemic, the study's research goal was to determine how students felt about the topic of informatics as a teacher. The eLearning is the choice of studying in education sectors between the staff and student community. When asked, how much time the teaching staff spent preparing for a week of classroom instruction, the students were required to provide an estimate of how much time they spent on homework at home. In addition, students had to express their dissatisfaction with their self-education and their desire for improvement. There was also a place for notes on their health and how they were feeling at the time of the interview [27, 28]. Any remarks or wishes for the instructor might also be included in this section.

1. To begin with, training is individualised to the individual student, who sets the pace for his own progress.
2. The learning route is developed according to the learner's qualities and accomplishments in adaptive learning.
3. In a learning community, the learner is able to gain new information and skills by interacting with and exchanging ideas with other members.
4. When more than one student engages in a virtual learning environment, it is called collaborative learning with intelligent tutorial system.

When a researcher does an exploratory study, it's because he wants to learn more about the issue he is trying to solve by looking at a few representative instances. In addition, researchers do extensive research on the factors they want to study. Researchers conducted in-depth interviews with a number of experts and set up a virtual classroom for students to learn from. People's expertise and experience are tapped during in-depth interviews with information that is directly relevant to the problem or opportunity being discussed. The goal of qualitative research is to obtain the explanation of the most fundamental ideas via the collection of specific and deep data.

3.3 Proposed Visualization Modeling

In this proposed eLearning, the graphics enhance information comprehension by highlighting the most important information bits. As a result, it enhances learning effectiveness by aiding in information comprehension and learner analytics. Using graphical elements and interactions in study material is also connected to this learning method. As a result, information visualization has the potential to boost student achievement and advancement. To make learning easier for students and instructors alike, designers and educators use visual aids like diagrams and charts to provide information in an understandable fashion [29, 30]. E-learning will benefit from visual informatics, which provides a wide range of tools for creating theories, algorithms, and software solutions that increase information visualization and analysis.

4. Results and Discussion

The experimental exam was completed by 125 pupils from various schools in the Indian state of Tamil Nadu. The students were provided with questions about their preferable choice of learning protocol with three options of response, which is the industry standard, and they

were permitted to choose one or more options. In answer to the queries, just a small number of candidates, opted for three or all of the given alternatives. In this case, the observations demonstrate that only a small number of pupils have given namesake replies out of the whole group of responders.

Table 1. Obtained results from multi choice questionnaire

Learning Protocol	Test Nos.	Public school	Matric School	International School	Government School	Average
Active Learning	125	95	45	95	85	80
Social Learning	125	50	30	44	66	47.5
Smart Learning	125	117	120	125	109	117.75
Current Online Teaching Mode	125	20	10	24	10	16
Proposed Visualization	125	119	122	123	125	122.25

Table 1 shows the collected findings, where the students received multi-choice answer mode. It is observed that, maximum number of schoolchildren express their willingness to learn this proposed more visualization modelling method. Based on the statistical significance, it is proposed that the null hypothesis can be rejected, since students voted in a much higher rate than the students with neutral attitude. Moreover, according to the test of statistics it is recorded that there are more tasks to be worked on, than there were before the quarantine.

The students who answered single choice questionaire, may choose only one response out of the available options provided by the learning protocol. Alternatively, Table 2 presents the findings, where students received single-choice answer mode.

It has been determined by both sides of the experiments that the suggested visualisation modelling approach is superior the previous learning procedures. Furthermore, smart learning has been the most common learning approach; however, this recommended method has now become more popular than the previous learning method. Figure 2 and 3 show the tabulated values in plotted graph.

Table 2. Obtained results from single choice questionnaire

Learning Protocol	Test Nos.	Public school	Matric School	International School	Government School	Average
Active Learning	125	10	08	03	09	7.5
Social Learning	125	13	12	02	11	9.5
Smart Learning	125	22	10	30	20	20.5
Current Online Teaching Mode	125	12	05	20	05	10.5
Proposed Visualization	125	68	90	70	80	77

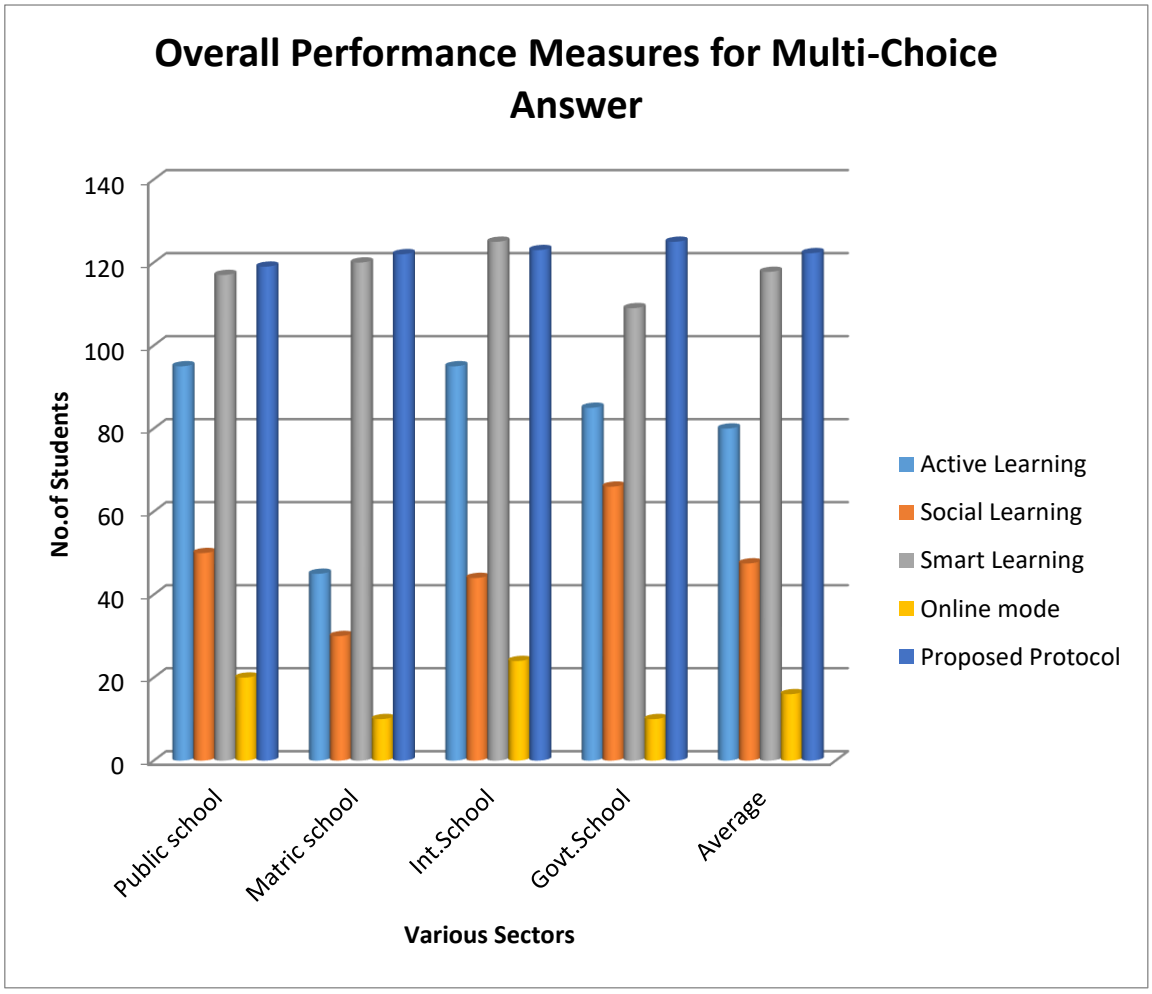

Figure 2. Obtained results from multi choice answer mode

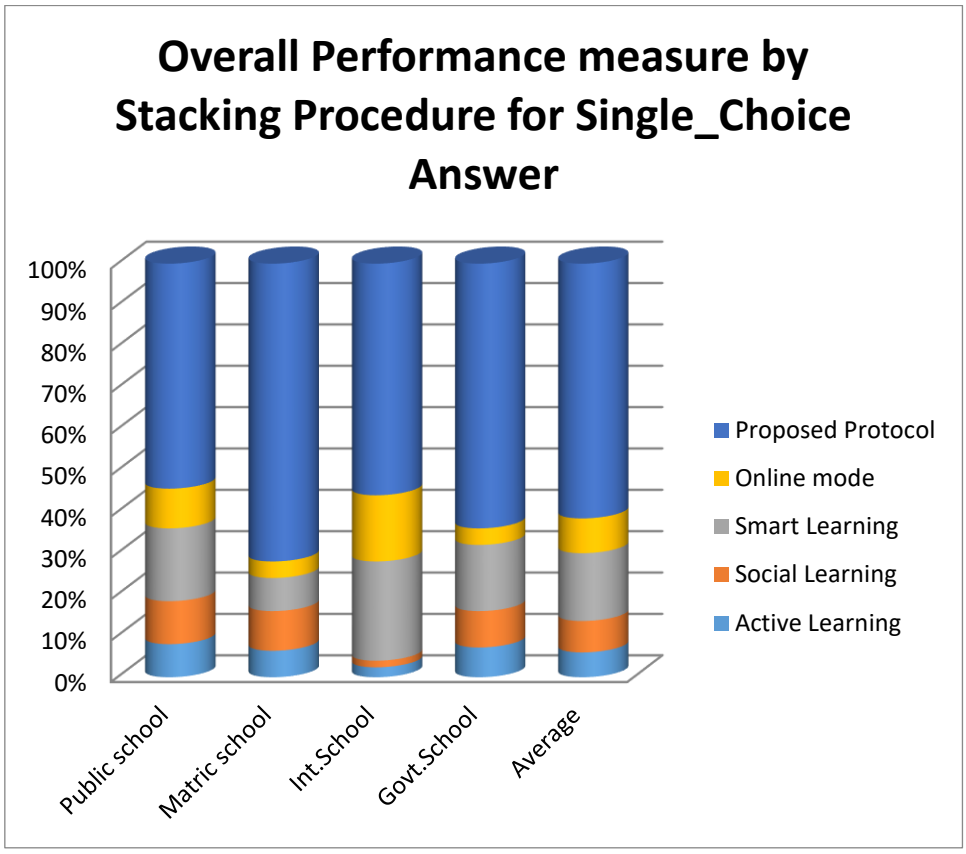

Figure 3. Obtained results from single choice answer mode

It has been demonstrated that this proposed model has received far more attention from current students than other traditional and tedious protocols used by various schools. The use of this proposed technological tools like media, portfolios, machines, networking hardware, virtual reality systems, augmented reality software, video conferencing software, assessment systems, intelligent tutoring systems, etc. to improve the effectiveness and quality of teaching and learning is related to the broader understanding of educational technology, learning technology, and instructional technology, and thus proved by various student's community.

5. Conclusion

Despite the difficulties, many have managed to complete their degrees through distance learning. eLearning has the added benefit of allowing students in the field of informatics to work with a system to facilitate distant learning with this proposed visualization method. As shown by the results, both the time and effort required for distance education were equivalent to face-to-face instruction. Besides, it proves that the single and multi-choice questionnaire stacking procedure is the most efficient approach than other traditional and smart eLearning methods. The average was also computed for all sectors of the schools. Furthermore, pupils

have conveyed that this kind of schooling is right for them in open-ended questions. In the future, virtual classrooms will use a variety of learning approaches in order to increase learning and student saturation. To further support the present learning models, numerous learning approaches are used. Additional machine learning approaches may be used in the future to support specified learning models.

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