

IMPACT OF INFORMATION COMMUNICATION AND TECHNOLOGY INTEGRATION ON STRESS & COGNITIVE LOAD

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ABSTRACT

Purpose –This research paper deals with the challenges educators face while integrating the latest ICT tools to teaching and learning process. One of the most positive changes taking place all over the world is the integration of ICT tools and related systems in the mainstream education. Many research studies over the decade have conducted by the educational technologists to study the stress factors that affect the students. The most important research required is the use of ICT integration to reduce cognitive load and stress. This research paper focuses the important aspects such as cognitive drive, cognitive load, stress and educator's opinions. Even though ICT integration increases stress among the educators and learners, it enhances the attention, perception, and retention capabilities. Particularly, the learners' performance and participation levels are increased due to the proper integration of new ICT tools. ICT integrated environment gives the flexibility to interact and share learning experience not only with their peer groups but also with their lecturers. Students can learn much more than the classroom instructions given by the teacher in the ICT environment. New digital tools have the potential to present the learning material in more motivating and attractive way.

Methodology –The researcher selected information in the Trichy as the field of research. Convenient sampling was followed to gather the information. Total 100 sample size was selected to find the fruitful information. The carefully constructed questionnaire was given to the respondents to do an investigation. The stress level was analyzed by using standardized NSAD stress questionnaire.

Findings – It is found that lecturers experience a certain amount of stress due to the presence of new digital ICT systems in the educational environment. An instructional designer constructing a system must have in mind, the organization of information both in the psychological and logical organization. The web designer must construct the web design with the educational psychologists' supervision to reduce the cognitive load.

Significance – Explaining the benefits of the integration of new digital tools and by giving structured software and hardware training required, educational administrators can able to reduce the stress level

among the lecturers. Questions such as what to learn? How to learn? How to integrate the new digital tools? What extends to integrate? are very important in the ICT integrated learning environment.

Keywords:ICT integration, Stress level, Cognitive load, Cognitive load theory, New digital tools,

INTRODUCTION

In the past, the impact of ICT tools and its integration into teaching was not as significant as it is today. ICT tools and new digital technologies are limited in those days. Nowadays new developed digital ICT tools have become the most important instrument to be incorporated in primary to higher education institutions. Teacher's role has changed from the learner-centered to student-centered. In the recent years, the role, the purpose, the nature of the educator (teacher /lecturer /faculty) has changed tremendously. ICT tools can also offer services in lesson preparation, educational administration, assessments, and communication. It needs a total transformation in the educational environment and in the teachers' mindset. Even though many teachers in the higher educational institutions has changed to use powerpoint and projector in their teaching process, still there is a lack of use of Web tools, Web learning system, E-learning system, CDs/DVDs, interactive whiteboard in the process. Here researchers' have to study the new concept cognitive load and stress. Learning to integrate new digital ICT tools in the teaching strategy is always difficult because it is developing every day and every hour.

ICT Tools

Information and communication technology change the society into information society which requires information as an essential wealth. In an information society, computer knowledge plays the crucial role in the transformation. Education is the main path for the knowledge society. Thus, information and communication technology integration into the main education strategy is the need of the hour. ICT integration into the educational sector from the primary to higher research level has major impact and transformation. M-Learning, E-Learning, Web-Learning, Computer based training, Computer-based collaborative learning, etc., has to be included in the mainstream teacher-centered learning environment. These technologies have the potential to change the educational environment into the student-centered learning environment. ICT devices include desktop computers, laptop computers, mobile phones, projectors, e-learning gadgets, game devices, animated CDs/DVDs, interactivity whiteboards, tablets, interactive TVs, simulators, virtual machines, video capturing devices, E-readers, satellite radios, CCTVs, ATM machines, fax machines, etc.,. Integration of the new information and communication tools via internet connection serves as a major transformation path to the current knowledge society. There are many research works are carried out by the research scholars to study the integration of the new ICT tools and their implementations' effect on education sectors. But very few research works are carried out in the field of stress and cognitive load caused by the integration of ICT tools in the education sectors.

There are different views about the integration of new information and communication technology tools in the education sector. Some research studies shows that there is a stress among the educators to learn the new technologies and their integration into the teaching process due to the technicality of the new system and the training time, cost, etc.,. Especially teaching through blackboard-web learning system and video capturing and posting system (E-learning) develops pressure among the educators to perform well. It increases the stress level among the educators to learn new tools and their integration into a

mainstream teaching strategy. But many tools such as projectors, laptops, tablets, mobile phones, reduce the stress among the educators to communicate in a friendly manner with their students.

Stress

Without understanding the basic operational procedures, software and hardware technologies, benefits, effects, advantages, etc., the teachers have many barriers in the process of learning and implementation. Moreover, willing to learn attitude and motivation are also very important. Unless there are a clear experimentation and benefits, a matured adult educator won't accept the integration of the very new digital tools. Due to the regular practice over a long period of their teaching strategy in old teaching methodology, many educators will feel stress in their teaching environment which will affect their teaching and work performance. Concrete research evidence, proper training, monetary benefits should be given to the educators to integrate the new digital ICT tools. The presence of many new digital ICT tools may be beneficial but it also creates pressures among the educators which leads to stress. Many research studies support the above statements. Job satisfaction, job performance, attitude, etc., plays a crucial role in the education sector. Stress always affects performance. Stress also affects the physical and psychological health of a person. Forcing a matured teacher to implement the very new digital tools in their teaching environment will always create stress which leads to quit their jobs and change the institution. Many educational institutions are giving 2 to 3 days training without any explanation and benefits of the educator which leads to lack of interest among the educators. Even though low-level stress will give benefits to sufferers to perform better, the pressures from the family, society, peer groups among the educators increase the pressure into a high stress.

Nowadays many engineers, lawyers, and scientists are changing their job sectors due to the availability and family circumstance. The relationship between overall job satisfaction and kind of work is an important area to study. Because if they like the teaching job they will like, they will perform well and they will learn new tools and they will implement new strategies in their teaching process. Nowadays many take up jobs because they are not able to get other jobs. Due to the unemployment rate, many motivated employees are forced to take teaching jobs. Further, if they are forced to learn new tools and softwares, they would feel more pressure. This is the main reason in the lack of digital tool implementation. The another main reason is the lack of skills and knowledge in the new digital technology. If the educational administrators do not have right attitude and knowledge and pressuring to implement the ICT tool without adequate infrastructure in the educational environment it will lead to frustration. Most teachers/lecturers between the age groups 30 to 40 are less satisfied with their work load which reduces their involvement due to the low salary and other benefits. Without job security, many self-financing teachers/ lecturers do not have motivation and attitudes to go extra miles.

Many educational institutions have no adequate funds to introduce the ICT tools and relevant environment in India. Infrastructure requirements and cost plays a crucial role in ICT implementation. This system is currently changing due to the digitization of data. Many developed countries are going beyond IoT and Web 4.0. Cloud learning is also developed in foreign countries such as Singapore, U.K, USA, German, etc., Digital citizenship is also developing a fast phase.

Cognitive load

Mental processes like memory and attention plays a crucial role in learning and communication. Processes such as attention, perception, sensory, knowledge gathering, memory, retention, etc., are due to the cognitive drives of the learners. Many educational technologists give importance to stimulus and response associations and links. Nowadays everybody gives importance to cognitive studies. Many courses are also introduced to study cognitive science. IIT Kanpur introduces the master level course in cognitive science which focuses mental processes, learning, technologies, etc.,. In the learning process, learners' forms a cognitive structure in memory which helps to forms and preserves information. It is an internal process. This cognitive process can be tested using cognitive load questionnaires, memory and retention questionnaire, attitude questionnaire, etc.,. Even though many factors affects the learning process, cognitive load is one the important process to study with differentsituations, and with different ICT technology tools. Prior technological knowledge plays an important role in cognitive structure formation. Introducing new systems in the learning environment side by side will be very beneficial to learn and update new digital tool.

The well constructed ICT tools' application is very useful to educate adult learners. For example, animated CDs/DVDs computers, projectors, internets, etc., has the potential to enhance the memory by getting the attention and perception of the learners. If the e learning system is introduced to the learners and teachers without prior training about the usability, it will create a mental stress to understand and execute the system. It will increase the cognitive load among the learners and teachers. It leads to cognitive problem on learning. The technologists should apply structured way like teaching from dots, lines, squares, to forms, structures, etc.,. It will create confusion which will increase their cognitive load to study the usability and functionality. Generally learning can be enhanced by the use of punishments and rewards. Same principle is also applicable to ICT combined environment. According to Tolman learning can be developed by the use rewards. It encourages the attitude to study further. This is not important for the highly motivated learner.

According to cognitive theory, mental processes such as attention, perception, verbal thinking, memory, visual thinking etc., are important in learning. Cognitive load is used to measure the mental effort and brain activity of the memory during the problem solving and learning process at a specific time. It also helps to study the human computer interaction and memory processes during the learning process. Cognitive load theory studies the various elements during the process of learning and memory.

Virtual University

Due to the development of new digital technology the teaching method is developed a lot. The e learning mode reduces the face to face learning contact and facilitates to self - phased learning method. It encourages the attitudes and self- motivation among the adult learners to study at their work place and at any time during their travelling hours. Virtual University breaks the barriers in the traditional teaching and learning system of education. It is very useful for the technology loving learners. Particularly, it helps the adult learners to go for a part time and full time job during their studies. This type of virtual university concept is growing in a very fast manner. For example, Asia e University, Malaysia has many courses related to ICT and management research in the e learning mode. Tamil virtual university, African virtual university, virtual global university, virtual university of Pakistan, Canadian virtual university, Jones international university, Michigan virtual university, etc., conducts many courses through virtual mode. There are not buildings and on campus facilities to study the courses in virtual universities. Generally

students study in the internet. The main drawbacks are the lack of interpersonal relations, authenticity of the course, certifications, approvals, validity, etc.,. Some universities are conducting courses along with open learning mode teaching and learning courses. But some universities are conducting courses without the main campus and fully via internet.

It is easier to study the new technology via virtual mode, and it will reduce the inter dependency between the teachers and learners in the teaching and learning process. In the virtual university system the educators, gives materials, multimedia applications, resources, etc., via internet. In this method, the learners communicate with each other through the digital media and communicate through internet to their teachers. The advent of new 4-G wi-fi technology, high speed accessibility, mobile devices, laptops, new mobile applications, can increases the wide use of virtual mode of learning. The study related to human and computer interaction plays a very important role in the virtual university system of education.

Educator's Role:

The digital skills and talents required are different from the traditional face to face teaching and learning methods for the digital system enabled learning method. Combining tools and technology in the education process which includes delivery process, evaluation process and management process requires information technology tools and adequate skills. There is a strong need to develop the new digital skills to understand the roles of new ICT application. It is very important to develop the educational process.

Learners' Role:

The learners should have the motivation and relevant skills to learn new digital tools in the e learning mode. There are no simple ways available to workout the solution in the e learning mode of learning. They have to understand the learning management system, ICT tools usability, user interface design, etc.,, to utilize its advantages through the e learning method. The learner's attitude to use the new technology is very important. It is not suitable to those who needs certificates rather than skills. Thinking skills will develop among the online learners than the traditional class room learners particularly in the IT area.

The personality, behavior and IQ the adult learners, has the vital rolls in the ICT collaborated learning method. To study the effective ness of ICT, researcher has to study the human factors and system functionality.

Strategies in the learning process:

The methods of teaching are classified into two types. They are teacher centered approach and student centered approach. Personalized system of instruction is also called keller Plan.

The main benefits of PSI are

Self-paced instruction and teaching

Mastery oriented of particular skills

Aid can be used

Use of printed study materials and tutorials

Programmed instruction:

Programmed instructions are classified into many types. They are linear mode of programmed instruction, branched instruction and, mathematical model of instruction. ICT tools and technologies develop the concept of individualized system of learning and programmed instruction in the learning process. It enhances the learn ability in PSI a programmed instruction.

LITERATURE REVIEW

According to (Jung, 2012), online collaboration develops four types of stress among the learners. They are Stress type I, Stress type II, Stress type III, Stress type IV. In other words, stress Type I is caused due to the lack of self-confidence. Type II stress is caused due to poor design of the material. Type III stress is caused due to use of new technology and Type IV stress is caused due to the interactions with other learners. According to (Simson, 2000), online learning environment creates stress among the low competent students to study along with highly talented peer groups. (Makitalo et al, 2005), also study the problems such as ineffective online course design. lack of clear structure, difficult tasks, and ineffective instructions etc. According to them, it caused more stress among the slow learners. According to (Cohen, 2003) Technical problems, cognitive load, lack of motivation, lack of trust among the learners, etc., are the main drawbacks of online learning. (Sweller,1988) Introduces the concept of worked examples by studying the cognitive load theory of learning .(Sweller, 2006) Worked examples reduce the stress among the learners by applying the same methods in their learning environment. It also helps to reduce the cognitive load among the online learners. (Renkl, Hilbert &Schworm, 2009) Double content worked example concept was introduced and it helps to reduce the cognitive load by giving two levels of execution of learners' cognition.

According to (Sweller, 2003), learning happened based on the cognitive style of the learner. Cognitive style differences based on the tendency to prefer and process information in the learning environment. Learning affected by cognitive processes such as perceptual and conceptual fields. Cognitive load theory used to explain the mental processes happens during the mental process in web-based learning system and multimedia learning system.(Sweller, 2011), there are no direct measurement scales are available to study the concept of cognitive load. By using questionnaires related to cognitive aspects such as memory, perception, retention, etc., researchers are calculating the load and level. (Kirschner, 2009), Mental effort and cognitive load among the collaborative online learners. He found the relationship between reduced mental effort among the learners due to their collaborative efforts during their online studies. He concluded that cognitive load is reduced in online learning environment. Thus he found the usage of ICT tool and its benefits .According to (Kudo, Choi & Jung, 2010), it is possible to reduce the cognitive load during the online learning by segmenting the tasks. According to him, reducing intrinsic cognitive load is possible through decomposing the material and the process). According to (Clark et al &Sweller, 2006), cognitive load theory has certainly proved principles in the learning environment which dealt with mental processes. (Ayres &Paas , 2009), double worked content concept which dealt the two main aspects of the learning environment. It was based on the learning domain and composition and observation domain. According to (McConnell, 2000), online collaboration has facilitated the learning experience by sharing experience, knowledge, opinions, facts, etc.,

OBJECTIVES

1. To study the impact of ICT integration into the new learning environment.
2. To study the stress level among the faculties and students.
3. To enhance the ICT environment
4. To study the impact of cognitive load on the learning process.
5. To study the impact of ICT tools and perception among the learners and teachers.

HYPOTHESIS

1. There is a significant difference between ICT integration and stress.
2. There is a significant difference between cognitive load and stress
3. There is a significant difference between prior digital tool knowledge and stress among the lecturers.
4. There is a significant association between the cognitive load and satisfaction level.
5. There is a significant difference between the performance and cognitive drive.
6. There is a significant association between the stress and retention level among the students.

This research paper investigated the stress level among the lecturers and students in the ICT integrated environment. To study this, stress questionnaire was used.

METHODOLOGY

SAMPLING

In the present study, the researcher selected information in the Trichy as the field of research. Convenient sampling was followed to gather the information. Total 100 sample size was selected to find the fruitful information. The carefully constructed questionnaire was given to the respondents to do an investigation. The stress level was analyzed by using standardized NSAD stress questionnaire. Cognitive load also found out by using cognitive load questionnaire which included questions related to memory, retention, perception, difficulty in ICT applied learning system and the environment. The opinion of the learners and students gathered by the informal way. This study investigates the opinion of the teachers and their stress level in the new ICT tool applied teaching environment.

TOOLS OF DATA COLLECTION

For this research study, the researcher used NSAD standardized questionnaire to assess the stress level among the lecturers and students. Five points Likert scale was applied to study the satisfaction level among the lecturers and students.

Data Analysis

Table 1

ICT Tool Integration

Statements	Yes	No	Total
Feeling stress to integrate ICT new tools	56	44	100
We need proper training	90	10	100
We need timeframe to integrate	72	28	100

Table 1, It is observed that 56 % lecturers feel stress to integrate the new digital tools in their teaching environment. 90 % lecturers expect the proper training in the ICT environment. More than 70 % of lecturers expects certain time frame to implement.

Table 2

ICT Tools study the satisfaction level

Statements	Yes	No	Total
We like the ICT system and feel satisfied	94	6	100
Some tasks are difficult to understand	58	42	100
It is flexible and friendly to communicate	96	8	100

Table 2, It is observed that 94 % students like the ICT tools integration. 58 % students feel stress to understand. More than 96 % of students feel friendly and flexible learning environment.

FINDINGS OF THE STUDY

1. There is a significant difference among the learner's attitude and ICT tools usage.
2. There is a significant positive relationship between prior ICT experience and stress.
3. More than ninety-five percent students (96 %) favor the concept of ICT integration.
4. More than seventy (72 %) teachers agree on the concept of ICT integration into their teaching and learning process with the certain time period.
5. There is a significant difference in personal factors and stress level in the ICT applied environment.
6. Web learning system with more links and difficult graphics increases cognitive load which will affect the interest of the learners.
7. By introducing flexible ICT environment, educationalists can achieve the desired output from the learners.

LIMITATION OF THE STUDY

There are many tools available to study the stress level among the learners as well teachers. The researcher used NSAD standardized questionnaire to find out the stress level. This result can be further enhanced by considering the geographical differences, cultural differences, time differences, etc. There are no standardized tools available to find the cognitive load in the new digital learning system. The researcher used questionnaire based on the cognitive load theory. Due to the time limit and availability, the researcher selected data from 100 samples.

SUGGESTIONS

1. Stress is one of the main factors which affect the integration of new digital ICT tools and web systems into the educational environment. Stress level should be reduced by proper suggestions and training.
2. Counseling programs can help educators to understand the benefits, uses of new digital ICT tools' integration.
3. ICT integration related policies should be initiated by the government to reduce the complexities.
4. The impact of stress is harmful not only to the teachers but also to the learners.
5. As teachers are capable and confident that they are capable of learning new ICT tools and integration themselves, some sort of time period should be given to them to practice it in their profession.
6. Teaching environment should be in a flexible way without stress.

CONCLUSION

To reduce the stress level, teachers should be given freedom to learn and given enough timeframe to integrate new digital medium in their teaching process. Integration of multiple digital media in an ICT system increases the cognitive load which can be reduced by introducing ICT related topics and practical ICT applications in the lower level of education. It is important to cope with the latest technological development and advancements. More engaged students in the learning environment are the benefit of ICT integration. It also reduces the competition in the learning environment and develops cooperative environment. Study about the cognitive load and stress leads to the new and innovative are on individualized instruction based on the differences among the learners. By introducing the concept of worked examples the educational technologies can reduce the cognitive load among the learner in ICT integrated environment. The concept of worked examples inclusion in the educational technologists can reduce the cognitive load among the learner in ICT integrated environment.

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