



ISSN: 2395-7852



International Journal of Advanced Research in Arts, Science, Engineering & Management

Volume 10, Issue 3, May 2023



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 6.551

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Role of Technology in Dissemination of Science Education in Open and Distance Learning

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ABSTRACT: Open and distance learning is getting more dependent on information and communication technology (ICT) and has been playing an important role in the delivery strategies of distance learning. With the advancement in technology in the field education has introduces variety of new techniques for educators and learners to enhance knowledge. Educational technologies (information and communication technology) are replacing direct teacher-student interaction. Anything that helps distance learners to communicate: learner with instructor, learner with learner and learner with the learning materials may be term as information technology. Technological advancements especially in the area of ICT allow teachers to employ various strategies that could actively engage student's interest. This paper focuses the role of information and communication technologies (ICT) in open and distance education. This study also explores technology-based media which is very important for distance learners.

Keywords: technology, dissemination, science, open and distance learning, advancement, student, teachers

I. INTRODUCTION

The term „technology“ means Techniques or Science of Art. „Technology“ has been derived from the Greek word „Technikos“ which means „an Art“. Technology is concerned with skill or expertise .So technology means to use scientific knowledge in daily life in order to achieve excellence. Technology is not limited to the use of machine and the aim is to apply the scientific knowledge in order to obtain a practical result.¹ The humankind has created science and technologies from the wheel of the computer and the changes were significative in their relations between the human beings and the nature, overcoming the traditional learning and teaching process. The Education is mainly considered as a process of human development. Education is a comprehensive process and imparting of instruction is one of the several means to achieve the goals of education. Education is the „third eye“² of man, which gives him an insight into all affairs and teachers him how to act, it leads us to our salvation, it leads us to all round progress and prosperity. Distance Education takes place where a teacher and students are separated by physical distance. The concept of Distance Education³ has emerged as a result of man“s search for an education which could be provided to a person at home. „Necessity is the mother of invention“ is too well known a proverb to be elicited.⁴ As the cost of delivering quality education increases, institutions find that limited resources prevent them from building facilities, hiring faculty, or expanding curricula. They are using Distance Education to maximize resources and are combining their asserts with others to produce programming. Distance Education is offered internationally, nationally, regionally⁵ and locally over all forms of conferencing technology.

Technologies used to support ODL can be classified into two main categories, the first being hardware and second being, software.⁶ The hardware currently in use are radio, television, telephone (land, mobile, fax, Voice over Internet Protocol or VoIP), and computers. Fiber optic cables, satellite and microwave transmission facilities made enhancements to the technological infrastructure. Much variation can be observed in the software components needed to support distance education (DE).⁷ Such DE software tends to be customized to address variables such as: specific applications or purpose for which it will be used; the combination of hardware used to support DE applications; and features that need to be incorporated to meet users' needs. Customized forms of software is typically evident in the form of learning management systems (LMS)⁸ that are used to simulate classroom settings and facilitate academic discussions or interactions. LMS are often meshed with other, pre-existing technologies such as databases and digital libraries.⁹ Thus, various forms of LMS and their related hard- and software-components



necessitates the formulation of appropriate policies, processes, and procedures that must align with preexisting policies, processes, and procedures – all of which must work in concert to support the smooth operation of the technology.¹⁰

It is reiterated here again that in the ODL (Open and Distance Learning) mode of education, learner support services systems (LSSS) shall play a pivotal role in the expansion of the same across the country.¹¹ The present system comprises activities of finalization of admission process, despatch of course materials and post-admission support. Practically providing support services in a systematic manner may not be an easier task.¹² The LSSS has to be designed and developed in such a way which may facilitate the learner community. Generally every learner expects better support services from the institution where one has enrolled. The institution shall recognise the basic needs of the learners and try to fulfil them to the best of its abilities. The institutions should understand the effects on the learners when the needs are not fulfilled. The support services thus identified are mainly in the fields of Establishment of Centres, Registration; Material Distribution; Library; Media; Examination & Evaluation for the distance learner community.¹³ Apart from this, the institution should ensure the availability of qualitative study materials before launching any programme of study. At this point it is imperative that the responses from both the sides – the service providers as well as the service receivers – the learners or students are also accounted for while implementing the programme so that a balanced development can be expected in the end.¹⁴ This is because despite all our claims to the effect, unless the end-users – the learners or students are satisfied and are able to utilize the services properly there would be no meaning to providing them. Our priority is to utilize ICT in the optimum way for providing a smooth and state-of-the-art and futuristic learner support services to the learning community as well as how to increase the GER ratio through this system in the days to come.¹⁵ As most of the established news media groups are finding it quite difficult to ignore the challenge of social networks and virtual communities via the net, their kind of information dissemination is expected to conform to at least some basic amount of journalistic principles rather than others.

“The Press is the best instrument for enlightening the mind of man, and improving him as a rational, moral and social being,” Thomas Jefferson, former President of the USA.¹⁶ “Communication is not only a system of information, but also an integral part of education and development” – Sean MacBride, One World : Many Voices. These two statements above is reflective of the immense importance of communication as an integral tool for spreading and disseminating education amongst the masses to the largest possible extent in any society across the world. At this point it needs to be mentioned that in today’s era the buzz word is “information is power”¹⁷. This is because only when a person acquires information through any formal or informal mode of communication he or she becomes enlightened and thereby is expected to become empowered to tackle the challenges thrown up by life’s journey ahead. Acquiring knowledge is nothing but acquiring various findings,¹⁸ wisdom which are results of long years of research into both pure and applied aspects of things in our day-to-day life. And after processing the same one has to apply it in real life situation for living a scientific and logical standard of life. In this world, there is hardly any dearth of knowledge in almost each and every field of our life.²⁰ It is because the institutions of higher learning, dedicated research institutions in so many fields of life (whether it is pure sciences, medical sciences, engineering and technology or social sciences or humanities) are constantly carrying out path-breaking research with results which possess the potential to bring about far-reaching positive changes in the life of mankind²¹. For example, we have agriculture universities, veterinary colleges, research institutions into various diseases, institutions dedicated to producing medicines, vaccines for different life-threatening diseases etc. both within and outside the country. And they do arrive at results which are highly positive and potentially beneficial if they can be applied to the welfare of the masses. Herein lies the question – how to disseminate these knowledge base to the masses. And at this point the significance of mass communication and media comes to the fore.²²

II. DISCUSSION

Media differ in their use of symbol systems to represent different kinds of knowledge. According to Solomon (1979) there are three kinds of systems-digital, analogic and iconic. The digital system is text based and are logically related²³ (e.g. books, computers). Analogic symbol system are more expressive and represent performance of dynamic activities (e.g. television). The iconic symbol system depends upon pictures, colors and signs for encoding knowledge. The combined use of symbol systems influence the way different media can represent knowledge. To



enable the learner in distance education to get ²⁴what his counterpart in the conventional system receives, we use a combination of media to represent all the symbol systems. For example, a lecture could be replaced by a printed text, a practical demonstration through a video, discussion through an audio and so on.²⁵ Some media are better suited to represent certain teaching tasks. For example, television can provide direct and concrete experiences to learners as it can: a demonstrate processes or procedures; a show 'models' or construct examples of abstract ideas; a demonstrate interpersonal communication; and a hamatise or reconstruct events through documentary style of production²⁶

Technology acceptance among its users is vital to ensuring the success of the system's implementation. Hence, it is important to understand and identify the factors that affect students' acceptance of SM (Students Model) learning.²⁷ Scholars have presented several theories to determine the important factors that contribute to the acceptance of technology and SM in teaching and learning. Among these theories, the TAM (Technology Acceptance Model), developed has been widely used in studies aiming to determine the factors affecting users' acceptance of new technology.²⁸ The TAM model focuses on two primary factors, namely PEU (Perceived Ease of Use) and PU (Perceived Usefulness), which influence individuals' intention to use new technology. According to the TAM model, external variables influence individuals' internal beliefs, and the sequential relationship between individuals' personal beliefs, attitudes, and behavioral intentions leads them to use the actual system,²⁹ which, in turn, helps researchers predict the acceptance of technology by its users. Many studies have used the TAM to explore the acceptance of technology among students in its original form, while others have used the extended model.³⁰

Over the past several years, perceptions of online learning have been shifting favorably as more learners and educators see online learning as a viable alternative to some forms of face-to-face learning. Many universities and HRD (Human Resource Development) programs are looking toward best practices to enhance learning and curriculum design.³¹

Blended learning has become a popular trend as a way to leverage the digital platform for educational purposes. Blended learning is a “coherent design approach that openly assesses and integrates the strengths of face to face and online learning to address worthwhile educational goals”³². The advantages of blended learning include that learning can become more efficient and effective; students are able to pace themselves; teachers and students are more engaged; and retention of the content can increase.³³ This approach allows for ease of access, flexibility, and the integration of sophisticated multimedia and technologies. In addition, blending learning develops a webbed environment in which the new digital system becomes part of the organization. If properly implemented, the dynamic relationship between faculty and students can be enriched and enhanced through the use of digital objects (audio, video, and text).³⁴

Research on blended and online learning has shifted to understanding the impact of digital modes on students. One of the primary purposes of blended education is to fuel learning both inside and outside the classroom.³⁵ Like VHRD (Virtual Human Resource Development), blended learning creates an informal learning environment that allows the student to connect learning experiences in between the formal learning events. Current findings show an increase in creative thinking, independent study, and the ability for the student to tailor learning experiences to meet their individual needs found that the use of technology has a direct positive relationship with students' engagement and self-directed learning but no significant effect on the student's academic performance.³⁶ Researchers indicated that blended learning can lead to active learners who master their learning content and increase learner modes of critical thought ensuring students' growth at their own level and use of techniques of multimedia applications and video application have greater collaboration skills and research skills. Most of the research indicates that it is too early to fully understand the long-term impact that technology is having on our students and there is a need to further research this area, especially in higher education settings.

III. RESULTS

The advent of COVID-19 has required EYES to use technology to support parents and children at home. With over 50 million users, 61% within the 18–44 age range, Facebook has a ready audience of parents ready to receive information. Technology was used to maintain communication and settings reported using websites, apps and social



media to engage parents by sharing home learning guidance and child development information³¹. Early years providers felt that communicating in this way was effective and shared their intention to continue this practice. Some went further expressing a belief that digital communication had increased capacity to provide support for families. There was a significant need to offer support during the pandemic; 65% of parents with young children at home reported feeling stressed, worried or overwhelmed. In the absence of physical contact, technology provided a vital bridge between homes and early years providers.³² The role of parents as powerful influencers on early educational outcomes was acknowledged in 2000 with the seminal introduction of the first early years curriculum guidance. This document recognised parents as ‘first and most enduring educators’ for the first time. Today, parent partnership forms a key part of the Early Years Foundation Stage (EYFS) framework. It is embedded within its principles, both in the statutory framework and non-statutory guidance.³³ The recently updated ‘Development Matters’ document recognises a societal change in attitude, emphasising the key role of parents: ‘The help that parents give their children at home has a very significant impact on their learning’. There are many factors that lead to digital exclusion including accessibility to suitable electronic devices and the internet, lack of necessary skills and lack of personal motivation. These are barriers for both for EYEs and parents.³⁴ In April 2020, it was essential to enable regular and convenient communication with parents locked down at home with their children. Digital inequalities placed some families at an immediate disadvantage as emergency remote learning throughout the phases of education was organised; 22% of the population do not have the skills to use the internet for everyday life, with low-income groups 40% less likely to have foundation digital skills than those more privileged and 4/10 benefit claimants have very low digital engagement. These factors demonstrate the current existence of barriers that impact on the ability of EYEs to communicate effectively with all parents. More positively, there is a suggestion that as SMART phones become more accessible to all, technological engagement is reaching across socio-economic groups from high to low. Growth in smartphone³⁵ use may be expanding but people in lower socio-economic groups remain less likely to own one. The pandemic provided an insight into previously unseen working practices with local authorities and early years educators forced to work in partnership with early years settings and parents solely using digital technology. The study concurs with research from the World Economic Forum online systems and platforms were available, the early years sector appeared digitally ready to manage the crisis³⁶. It was these systems, the timely creation and publication of the digital guide, the role of LAs as gatekeepers and the digital skill and motivation of EYEs that enabled the translational research process to be effective in terms of sharing the guide with parents.

Various stakeholders utilised a variety of digital technology platforms to disseminate the digital guide. Some parents accessed the guide directly from source with others taking a more indirect route via local authorities and EYEs.³⁰ This route proved valuable to practitioners who also furthered their own knowledge and understanding of early education. There is a clear opportunity for the early years sector to refine and use translational research to access research knowledge to improve setting practice and influence home learning environments²⁸. Practitioners and parent feedback was the stimulus for the digital poster development. If the digital posters had been created and shared initially, it would be logical to assume these would have gained traction as the original digital guide did. Had this occurred the impact is likely to have been greater. EYEs could have introduced the posters over a number of weeks encouraging a steady interest and growth in understanding of the value of play and how young children learn through playful encounters with responsive adults²⁹. There are challenges to engaging with diverse families. The number of downloads and the dissemination of the guide by professionals would suggest high levels of parental involvement but data collection was unable to show how many parents actually downloaded the guide, who those parents were or how effectively they used the guide at home. This is an important desired outcome that requires further investigation³³. There seems to be a combination of factors that impacted on the speed and scale of sharing and downloading the digital guide. First, being digitally ready; platforms such as email social media were already used by EYEs (Early Years Educators)³⁵ and LA (Learning Aids). Second, the professional drive of LAs and EYEs to support families during a crisis situation and finally the availability of an easily accessible online resource seen as valuable in improving play-based learning at home.

IV. CONCLUSIONS

The characteristics of information dissemination in college information networks using information entropy and ReliefF algorithm to fuse individual attribute characteristics, calculate different attribute weights, and correct the



problem of feature equality in traditional clustering algorithms.³¹ The influence and intimacy of individuals greatly improved the accuracy of learning community clustering. Based on learning community preclustering and optimizing information delivery methods, a new type of information network information dissemination model was finally developed. The comparative test results showed that the proposed model can achieve the same degree of information dissemination coverage with a smaller information delivery rate than the traditional model.³² Revolution in information and communication technologies has reduced national boundaries to meaningless lines drawn on maps. In this scenario, education has been identified as one of the services which need to be opened up for free flow of trade between countries. ICTs use in modern education can save a lot of money of the Government.³³ Moreover a lot of qualitative improvement can be seen as resource persons for the training can be best of the world. ICT can be helpful in quality and standards of education by implementing it in various phases of education. But lack of resources within the educational sector educational is a hindrance in the implementation of ICT in developing in 21st century.³⁴ The task of employment and integration of ICT in modern education is facing a lot of challenges. the challenges like- availability of ICT facilities in educational institution, lack of knowledge to handle ICT equipment, language problem, insufficient funds, lack of trained etc. but we can overcome the challenges- to create awareness on ICT Education,³⁵ to formulate policies to promote broad access to skills and competencies for learning and adopting ICT, enlarge community participation for self-sustainability in ICT application, develop supportive infrastructure facilities such as electricity, internet, etc³⁶. Government should actively. Responsible authorities have to try and overcome these challenges, so that the modern education can benefit and also its help teachers and institutions to be more modern and dynamic. Eventually, the use of ICT will enhance the learning experiences of students. It also helps for building a successful career, in a technology savvy world.

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