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Integration of Digital Technology in Academics

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Abstract— *The report aims to identify level of technological integration in academics. Digital literacy enhances learning and knowledge of learners. The benefits of digital literacy are evident in the students' progress. Active learning is obtained through digital technology as well as literacy enhancement. Considering these benefits, an analysis of technology integration is conducted.*

The analysis reveals that desired level of technology integration is not achieved in academics. There are several barriers of poor technology integration. Poor technological infrastructure, budget deficit and poor access to technological resources are identified. Lack of time to devote learning of technological competencies is also reported by the analysis. Lack of resources, limited access, insufficient knowledge and skills of teachers and support staffs, lack of support from administrative and teachers, as well as other factors are found responsible for poor technological integration in academics. Institutional barriers are also identified as barriers such as poor leadership or structure of academic institutions. Leader's inability to understand relevance of technology for learning is a major hindrance. In assessment, teachers do not have sufficient time to implement technology thus they do not use the technological aspects fruitfully. Lack of professional development of the teachers is also a barrier. Many teachers and supportive staff want to maintain the status quo and do not feel that technology integration is required. Such attitudes also prevent technology integration in the academic institutions.

Thus, several recommendations are provided by the report such as providing professional development opportunities to the teachers, creating a shared vision, involving stakeholdes, findings cheaper alternatives for digital tools use, seeking grants and funds from government and private organizations, addressing resistance to change by providing training regarding benefits of technology adaption in the classroom etc. the recommendations also include rotating classes and students in groups for collaborative learning, appointing students helpers, allotting more times to the teachers for technological competencies, arranging regular meetings for technology integration, addressing issues of lack of resources, etc. These recommendations can help the academic institutions to integrate technology well in academics.

Keywords— ***Digital Technology, digital literacy, outcomes of education.***

I. INTRODUCTION

Communicate technology age shows reliance on digital technology. The intellectual capacity of the society is enhanced with digital literacy. There are many kinds of literacy such as ICT literacy, online information obtaining literacy, literacy related to technology and then digital literacy (Hilbert, 2011). Here the term literacy reveals all kinds of methods used in writing, speaking, reading, thinking, and listening to identify problems (Pinto, 2017). The digital literacy enables the people to participate actively (Rowley, 2015). It is also found that digital literacy requires trained mentors, and trust between students and teachers (Mohammadyari, 2015).

Digital technology integration is thus necessary for learning in academics. Digital technology has many forms to impart education to people. There is virtual learning or online classes that provide learning opportunities (U.S. Department of Education). Full time schools are available online for the students. These findings reveal that digital technology is well adapted by the education sector to

provide learning. Digital sources such as digital portfolios, electronic books, real time feedbacks, and learning games are some of examples of the digital technology used in the academics. Thus, in this report, the analysis of digital technology integration in academics is conducted. The report also analyzes the barriers of digital technology integration in academics. Finally, recommendations and conclusions are provided.

Attainment of students

Digital technology is found assistive to develop educational level of students. In this section, a critical analysis of benefits of digital technology on students is examined to identify level of integration of it in academics.

Digital tools are found to enhance attainment of children. Positive associated are established between digital technology use and outcomes of education (Higgins). There is a link between digital technology use and enhanced level of performance of school

Liao et al (2008) also finds that positive effects of digital technology are found on learning. Thus, it reveals that digital technology has potential to enhance learning and it should be implemented in academics. Jewitt et al (2011) report reveals that active learning is possible with digital resources use. Further, the same report finds that active learning takes place outside the classroom as well. Learning resources are chosen by the learners and digital resources also provide safe places for feedback and assessment.

Literacy enhancement

The findings reveal that digital technology enhances reading and writing skills of students. They also develop good listening and speaking skills. However, it is also found that digital technology adaption requires support from academicians and schools as well as seeks training (Archer). Implementation factor, therefore, is crucial to implement digital technology effectively.

Digital technology impact on literacy skills

It is found that digital learning can provide good impact on writing (Higgins). It is also revealed by the research that digital technology is equally good for different subjects (Liao).

Digital tools effect

Interactive whiteboards are effective to provide learning. EBooks and e-readers impact on improving scores of learners (Hess). Digital tools can provide better reading comprehension and vocabulary comprehension.

The analysis of benefits reveals that several benefits are provided by the digital technology. Digital technology is found to provide more motivation to the learners. Study reveals that digital tools can improve literacy level of students. Many authors such as Reed et al (2013) and Zheng et al (2014) find digital technology helpful for the students. These findings suggest that the digital technology is well integrated into the academics. In the next section, the integration level of digital technology is examined.

Integration of digital technology

Analogous signals transformation to digital transformation allowed teachers to use electronic equipments for teaching. Many components are available for knowledge management system such as internet, local area network, and intranet. Speedy transfer of information is provided with internet applications. Education system has integrated information and communication technology system to enhance understanding. However, it is found that digital technology use in the classroom setting is still not reached to that level that can generate systematic change. teachers' excellent approach to teach through ICT application is facilitating however, contextual factors such as trust factor, school climate or network existence determine success of digital technology in academics. It is found that network existence to access knowledge and information, trust and ICT coordinator create a positive impact on the teachers to use digital technologies (Devolder).

It is necessary to integrate digital technology and for this purpose, teacher training is required. It is found that most of teaching practices involve only basic or superficial digital technologies use for communication or class preparation. Teachers are unable to use ICT completely. Teachers are required to foster an approach to learn asynchronous and synchronous technologies such as online forums, social networks, and video conferencing, to enhance their ability to provide collaborative learning (Røkenes). The collaboration also requires that participation of teachers, students, trainers, researchers, and specialists is necessary.

Integration of digital technology requires a shared vision development regarding ICT role in education system. To assimilate digital technology by teachers, a challenge of teacher's actions contextualization in terms of historical, political, and economic reality is found (Phelps). Teacher training for technology use in academics requires a scalable and sustainable training that is a challenge to implement digital technology. Also, the challenge of didactic innovation is also present to assimilate technology in academics (Asensio-Pérez). During the new normal OECD findings reveal that challenges such as ensuring family support, and continuous learning for students are present and main obstacles experienced by education systems are not having technological infrastructure, challenge to

manage technology infrastructure, challenge to address emotional status of students, etc. (Schleicher).

These findings reveal that the integration of digital technology in academics face many issues. It is found that poor technological infrastructure and financial issues, academic institutions are unable to provide digital learning education to the students. Better services as well as policies are not designed in the education sector (Rafi). The training content provided is not based on information communication technology. Findings suggest that students develop skills based on self-learning as the literacy regarding use of digital technology is not provided to them. Students in the academics' zone do not have sufficient digital literacy skills (Rafi).

II. BARRIERS OF DIGITAL TECHNOLOGY INTEGRATION IN ACADEMICS

Lack of time

It is found that lack of time is a major hindrance for technology integration in academics. Time is not available to plan technology integration or collaborate with people. Time factor also hampers to prepare integrated lessons. Materials are not developed due to time factor. Creative ideas are not developed due to this issue. Strategies are not developed to embed technology in the curriculum. Efficiency is not evaluated to implement efforts. Skills are not developed with progressing technologies due to time issue. Personal skills are not developed due to this factor. Expansion of professional and personal skills related to technology is also not obtained.

Lack of expertise

Teachers do not have sufficient expertise to use the technology. Also the inappropriate training to use technology causes a barrier to integrate digital technology. These issues are found in the academics.

Lack of resources

There are many educators find that resources are not adequate in the classroom due to limited technology availability, or insufficient time, or limited access. Fiscal resources are not provided to the teachers for professional training. Access to technology to improve expertise as well as support is not provided to integrate technology in the academic institutes. Budget is not provided for technology utilization. Technical support is also found inadequate to assimilate digital technology in academics. Educators who work in districts not having good socio-economic progress cause more issues as the budget cuts can cause them to have only fewer resources. Lack of technology due to not having hardware, internet, or software can lead to face more problems by teachers to integrate digital technology. With limited budgets, schools are unable to surpass the challenge of poor digital infrastructure. Insufficient access to technology due to not having access to technology in certain locations also leads to poor integration of digital technology. According to one report, even schools have computers, but they cannot access (Zhao). Limited access to library also causes students to not assimilate digital technology (Harwood). Time availability is required to integrate digital technology however it is found that it is a time-consuming process. Educators are required to spend hours to enhance hardware and software familiarity, and this is a tough ask for them. They can face burn out issue while learning hardware and software (Hew). The technical support is also found missing and schools and colleges are overwhelmed by the demands of teachers (Cuban).

Lack of support

The environment in the academics does not support for risk taking experimentation. There is lack of administrative and technical support to integrate technology in the class room settings. Value required for implementation of technology is also missing (Barriers to Technology Integration for Teaching and Learning).

Insufficient skills and knowledge

Teachers struggle due to lack of knowledge regarding specific technology use. They are not familiar with the technology pedagogy and management of technology related classroom. Such lack of knowledge makes them overwhelmed when they use a specific technology. Learning new technology de-motivates them to use any technology related activity. It is also found that teachers are worried about the fact that students may be more adept to use technology that they are not able to use.

Institutional barriers

The leadership, structure of school timetable, and school planning, all these can prevent to integrate the technology. Such challenges are difficult to surpass because that are not under control of individuals. Leadership is very vital because if the teachers and principals are not aware of technology use, students are not likely to use the technology effectively. Therefore, leaders in education system if are not interests to promote technology, then the technology assimilation does not take place. It is found that such institutional barrier is present in academics. Structure of school timetable also causes less time for students to devote to learn digital technology. Most of students do not have even one hour to complete work related to any subject (Becker). When schools are unable to provide comprehensive technology plans, often the students, teachers and school members become confused about how to use the technology. Therefore, educational institutes do

not make concrete plan regarding how to use technology, it acts as barrier.

Beliefs and attitudes

Teachers approach towards using technology also acts as barrier (Ertmer). The study reveals that teachers do not recognize importance of technology in the lives of students and therefore, students have perceptions that with better understanding by the teachers regarding technology, better use of technology can take place (Spires). Therefore, the perceptions of teachers also act as barrier to the technology assimilation. The digital tools integrated into the curriculum of schools are also based on attitude of teachers. Educational philosophies determine how technology will be implemented (Grant). Attitudes of teachers regarding technology as a tool to keep students busy or no relevance of technology also determines failure of technology integration in the education (P. A. Ertmer). Teachers having beliefs that content knowledge was more important can also pose hindrance to implementation of digital technology.

Assessment

It is found that there are pressures on educational system regarding testing and therefore, teachers do not have sufficient time to use technology. Technology integration is a time-consuming effort for them. When teachers are focused on developing teaching skills, they do not able to use technology effectively. It is also found that for assessment purposes, technology in schools is implemented and seldom is it used for instruction process. Therefore, focus is not created on use of computers for the purpose of teaching (Bichelmeyer). Thus, such emphasis defeats to recognize potential gain obtained from technology use. Fewer resources also lead to issues in technology integration. Students are also primarily focused on learning the test skills. They are not concerned to learn the 21st century skills as the educators perceive that teaching digital technology is not a necessity. Thus, the skills to learn computer or digital technology are not promoted or they are marginalized in curriculum of schools (Eisner). As the modern skills are hard to measure and they are not part of standardized tests, they are not promoted well by schools. Thus, it is found that technology is not properly used for effective formative assessment. Academic institutes lack the necessary adjustment and skills to use digital media tools for assessment. Timely feedback thus is not provided by the teachers.

Professional development

The next challenge is the lack of professional development of teachers to assimilate technology in the classroom settings. They are not fully prepared as found by the research. The schools when implement new technologies, teachers are found often unprepared to handle new technology. Therefore, the new investment made by the academic institutions are not utilized, or not used optimally.

Resistance to change

This is another barrier that prevents integration of digital technology in the academics. Many want to maintain the status quo due to relative comfort; however, such approach does not promote learning and digital technology integration. Technology experimentation is often considered by the academicians as not a part of their job description.

New models

It is also found that new models such as online course give competition, but many academic institutions are not adopting online course model. This also leads to poor technology integration in the academic institutes.

Informal learning

There are rigid model of lecture and tests still going on in the academic institutes and it also causes a barrier for technology integration. Opportunities are present to enhance informal learning for students however, such approach is still missing.

Not providing personalised learning

A gap is found between delivering personalised learning with differentiated instruction and availability of technology to deliver it (Nagel). Therefore, teachers may be willing to provide personalized learning; however, they do not have the right resources to provide so.

These reasons cause the educational institutes to suffer from poor integration of digital technology in academics.

Recommendations to integrate technology in academics

The research finds that there are several ways through which the technology can be integrated.

Shared vision creation

Administration of school, teachers and others should need to create a shared vision. To achieve this, justification is required to provide information about meaningful use of technology in the academics. It is suggested that technology needs to be used for better knowledge and understanding for students (AASL standards for 21st century learners). States also implement technological solutions such as digital tools for writing (Illinois Common State Standards). These examples should be shared with the academics to motivate them to adapt technology in teaching. It is found that administrators are motivated to approve technology when they find a considerable reason to do so (Cunningham). Also, the support from teachers is required. When the staff members

do not have similar philosophy, it may be daunting to achieve technology integration goal. Therefore, teachers need to be persuaded to use technology in the classroom setting. Demonstration of technology can also help to create a shared vision as the demonstration of technology integration can ensure better understanding regarding technology role to transform learning and instructions.

Addressing limited resources availability

Limited resources are found as a significant barrier for schools (Hew). Therefore, recommendation suggests that technology integration should use cheaper supplies as well as a set up of hybrid technology. For example, Netbook use can be promoted as it provides basic features required to fulfil educational purposes. It is also suggested that laptops can be used in place of extensive computer laboratories to save costs (Lowther). Studies have revealed that laptops can be viable for teaching purposes.

Rotation of classes and students

With small availability of computers or digital tools, it is feasible to rotate classes or students in groups. This can foster collaborative learning and access. In library, such setting is feasible to provide access to all students. Collaboration can be fostered when students learn in groups (Silvan-Kachala). Rotation method can be effective when explicit training is provided to the students.

Student helpers

Limited funds prevent academicians to integrate technology. Therefore, those students having personal skills in technology use can be helpful to integrate technology in academics.

Training and professional development

Teachers are benefitted largely by the professional development as their attitudes and beliefs are positively changed (Shaunessy). Teachers gain skills and knowledge to integrate technology (Fishman). Professional training is therefore, required to motivate teachers. Teachers are needed to develop correct knowledge and skills to integrate technology (Mulkeen). This reason also requires providing professional training to the teachers.

Addressing time issues

It is suggested that incentives and time both should be provided to academicians to be technology adept. Time should be provided to teachers and students for collaboration. Teachers should be allotted time to attend training, technology conferences, workshops, or seminars. A faculty meeting needs to be conducted regularly on technology integration. Business partners and parents should be encouraged to support technology integration responsibilities.

Addressing resources issues

Active support in the form of fiscal resource must be provided. Community and business partnership in this regard should be considered by the organizations. Access for teacher to current technologies must be provided. Academicians and institutes should lobby to provide funds for education reforms in collages and schools. Educational collaborative or regional consortiums can also be developed for loans at low interest or no interests to purchase technological equipments. Sharing costs of technology courses can also be an option. Negotiating agreement with vendors for discounted price can also be an option. Personals should be recruited or identified who can write dedicated grant proposals to private sectors and government.

Addressing lack of support issues

To address lack of support from technical and administrative, collaboration with stakeholders is required. A vision needs to be developed to utilize technology by teachers and students. Documentation of short- and long-term plans for technology must be shared with employees. Identification of non-monetary sources for support is also recommended. Technology awards should be provided to the teachers for their efforts to promote technology integration.

These recommendations can integrate digital technology in the academics effectively.

III. CONCLUSION

The analysis reveals that technology integration in academics is not at satisfactory level as there are various barriers to integrate technology in academics. The research suggests that to a limited extent, the technology integration takes places in academic institutions. The barriers such as lack of support for technological integration, lack of resources, lack of motivation, beliefs and values of teachers and other staffs, resistance to change the status quo, insufficient knowledge of teachers, lack of training opportunities, lack of time and other barriers prevent technology integration in the academic institutions.

Therefore, suggestions such as providing adequate support in various forms to integrate technology, providing training and development opportunities, providing sufficient time to the teachers to develop skills by participating in the training programs and in other programs are suggested. Recommendations such as findings resources at cheaper price or arranging economic arrangement such as rotation policy for resources access are suggested. Shared vision creation through various means is also recommended to integrate technology in academics.

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