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How Students Achieve Success using Technology: How Best to Study its Use in Schools.

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Abstract:- Technology integration is more than merely utilizing a computer as a typewriter, calculator,database filing cabinet, or other tasks. Technology integration begins with teacher planning to ensure integration is relevant to the student's educational experience. A literature review consideringthe impact on learning of technology integration into the curriculum: conjoinedwith an analysis and critique of the research about student achievement through the use of technology, may provide an impetus for change in how we(students) use technology to maximize learning. What is the academic performance success rate when utilizing technology within the classroom? What types of research have been done to demonstrate improved academic performance?

Keywords:- *Technology Integration, Learning, Teacher planning, academic performance.*

I. INTRODUCTION

Without computer technology in instruction, many documents would be handwritten. For some writers, reading, evaluating, or providing feedback is difficult because their handwriting may be illegible. It may not be possible. Technically, anything created from science is a technology; however, the terms technology and computer will be synonymous for this paper. A walk through times journal focusing on computer technology, the wheel up to the Canadarm, and eventually personal computers, society, and in this context, teachers, have used technology to teach, maybe reframing to say students have used technology to learn.

A reading of the Literature review regarding the impact on learning resulting from computer integration into the curriculum necessitates an awareness of the effects of incorporating technology use on students and teachers. The discussion will then shift to a sense of what achievement is and how it is determined. The literature will subsequently undergo analysis and a critique of technology-assisted student achievement. This discussion of academic performance will unfold by describing four types of learning. The impact of the Covid-19 Pandemic can be seen, heard, or read about in several Journals and online social media platforms. Still, only scholarly articles will be referenced here and included to some degree in discussing what is being used. A more detailed discussion of the technology used in the pandemic would require a more longitudinal study; even a cross-nation methodological approach may be warranted. Finally, this paper describes the types of research conducted that demonstrate improved academic performance.

This research will address the impact on learning brought about by technology integration. The segments of the article will address (A) The Impact of technology on teaching styles, (B) How teachers use technology to do assessments, (C) the accessibility to technology for teachers and students and how teachers use it, and (D) what types of technology professional development for teachers is readily available.

II. IMPACT ON TEACHING AND LEARNING

Hooper and Rieber (1999) described five phases of teachers' use of technology: (a) familiarization, (b) utilization, (c) integration, (d) reorientation, and (e) evolution. These phases that teachers progress through may stop at any time and most frequently do in the utilization phase. Integration implies daily or routine use of technology in curriculum provision, not sporadic use such as presentations, internet search activity, or reading from a web page. Bauer and Kenton (2005), in their qualitative study of 30 tech-savvy teachers, found some of the major obstacles to technology integration that prevents teachers from moving past the utilization phase included: (a) time, (b) hardware, (c) student skill level, and (d) internet use.

A common concern amongst teachers is that any new tool, especially one they don't really know, computers, will not enhance the teaching and learning experience. Okojie, Olinzock, and Okojie-Boulder (2006) suggest: "A major part of the problem related to technology integration is that most educators have not addressed the pedagogical principles that will guide their use of technology for teaching and learning." The pedagogical heritage of education persists in many classrooms. As with teaching other how to learn, teachers are no different and pass on their knowledge the same way it was passed on to them, and for most, that was not with the use of a computer.Even with the volumes of research knowledge educators now have from Gardner (1983), Blooms (1956), Dewey (1938), Kolb (1976), and others, insufficient numbers of teachers have made the leap to full technology used across curriculums.

Papert (1980) and Moersch (1999) shared a common ideology stressing computers arean excellent tool for promoting high learning. The development of higher cognitive skills is possible through the use of the computer. A forward-thinking, innovative teacher will need time to inquire, learn, plan, and ultimately implement the use of technology as a learning tool. For some, this may never come to fruition.

A solid foundation of knowledge in learning styles will aid teachers in using computers for instructional problem-solving environments. Current content knowledge and pedagogical knowledge, when aligned with the right tool for the right learning task, will increase the likelihood that computers are used in appropriate applications. McCoog (2007) felt a foundational knowledge of Multiple Intelligence could definitely assist students by having computers increase flexibility in learning scenarios.

III. ASSESSMENT OF LEARNING WITH TECHNOLOGY

Constructivists tell us we build our knowledge bankevery day. However, a battle over how to assess that newly built knowledge wages on. Measuring learning processesprovide the teacher and student with a more precise description of the student's knowledge, skills, and aptitudes at the given moment in time when the test is taken. The hope is that the assessment matches the learning. Research is showing knowing class by class what and if students have learned the objective of the day, is crucial - finding out often what a student knows and can do may be assisted through the advantage of computers (Duffey, 2004). Computer programs now have the inherent functionality to measure learning outcomes in learning events and link them to technology enabledpedagogy.

Standards-basedassessmentsmay take up valuable instructional time, are often heard as a determining factor for use of computers by teachers. They feel this is not teaching, and the tool is doing more than the teacher.However, with intelligent computer-facilitated assessment softwarenow assist teachers in creating reliable and validcomputer programs for measuring learning against said standards (Cooper, 2004). More and better technology tools are supporting teachers'move to incorporating their use in structured learning events. Many computer programs have the state standards for reading, math, and science built into their assessment strategies. These strategies also provide resources for teachers on how to incorporate technology or other learning resources into teacher lessons. There is also the consideration of the learning curve for students learning how to be successful on computer-based assessments. As of 2003, twelve states already had computer-based practice exams available to help students prepare for state-mandated tests (Borja, 2003). Advances such as assistive technologies permit enriched prospects for students with learning challenges to participate in the self-paced classroom fully. Using student success as the criteria for increasing or decreasing the use of technology in instruction should be a fundamental principle of pedagogical advancement.

IV. ACCESS TO TECHNOLOGY AND HOW TEACHERS USE IT

(Meyer, 200, Kleiner & Lewis, 2003, Powers et al. 2020) reports that the ratio of computers to students isdeclining, more in advantaged districts than disadvantaged, but overall, a decline is accelerating the ratio towards 1:1.

According to Buabeng-Andoh (2012), technology adoption and integration in teaching and learning have remained inadequate, in many countries, despite all the investments in infrastructure, equipment, and professional development of teachers. Ertmer and Ottenbreit-Leftwich (2012, 2013) further concluded that access to ICT is no longer a significant barrier to its integration in the classroom. Mundy, Kupczynski, and Kee (2012) state that teachers, even those that grew up using technology, are not utilizing it in their practice. Recent literature suggests that South Africa is no different, as only a small number of South African teachers are effectively integrating technology in the classroom (Nkula& Krauss, 2014; Padayachee, 2016).But what are they doing with them?

V. TECHNOLOGY PROFESSIONAL DEVELOPMENT FOR TEACHERS

In the past twodecades, much has been made of the digital divide, especially about the inequitable distribution of educational technologies in urban and rural schools versus suburban schools (Hess & Leal, 2001; Wenglinski, 1998). Lack of experience in technology use for instructional purposes seems to be, based on the existing research, to be the most challenging aspect of teacher professional development(Becker, 2001; Berson, 1996; VanFossen, 2001; OTA, 1995). A20-yearveteran teacher, or a rookie, both need for ongoing training and professional development to know the best technology to achieve the most significant level of student learning. Simple word processing and spreadsheet use are the basic skillsneeded by students and teachers alike (Becker, 1999; Hart, Allensworth, Lauen, & Gladden, 2002). Findings suggest it is difficult for most Luddites to create tasks requiring higher-order thinking without support.

The digital divide still exists in other aspects. However, less has been notedabout the problem of technology further expanding the divide in K-12 educational opportunities. Not necessarily because of lack of access to technology in education, but because of the human capital needs associated with effective use of that technology in the K-12 arena (Swain & Pearson, 2002). Providing professional development and encouragement for teachers to go to schools where highly trained and qualified teachers are needed would lessen those needy schools' staffing burden and reduce the need to sit and getprofessional development activities. In previousstaff training reviews, the most common form of training is offered as one-shot workshops, with teachers spending as little as 1 hour to 1 day in professional development per year in any given content area (Parsad, Lewis, & Farris, 2001). These experiences add little to teachers' repertoire and even less to student learning. With all these factors impacting teacher and student use of technology, achievement must be affected.

VI. TECHNOLOGY AND ACHIEVEMENT

Test results are often used as the measuring stick used by school personnel to determine student achievement or determine if a student passes a grade. Sometimes student test results are data used to rank a school's performances. Intellectual/cognitive, practical, interpersonal, and motivational achievements are recognized by Hargreaves (1985). This paper agrees with Hargreaves's (1985) ideology that achievement means more than test scores.

Therefore, achievement in this paper represents the use of scores on standardized tests, Bloom's taxonomy, Cognitive processing, Skill acquisition, and finally, motivation. The classifications mentioned above may organize the categories of tacit and explicit knowledge. Educators refer to explicit knowledge, such as that which students can pull off a web page and remember, but tacit knowledge comes through experiences, almost a constructivist approach to learning. Bransford, Brown, and Cocking, (2000) propose thattechnology can be a means to build or enhance both tacit and explicit knowledge.

VII. STANDARDIZED TESTS

As demonstrated through the NCLB legislation, the most discussed form of achievement that appears to drive educational reformis standardized test scores. Studies conducted on students' scores on standardized tests have shownsuccesses and failures for students even when using technology. So it appears that even standardized assessment results can be subjectively evaluated.

Students and teachers both need to learn how to do the work and complete technology-based assessments to assess the learning using the tool. The skills required to demonstrate and manipulate data with technology require more intricate technology skills.

Therefore, Online (OL) and Face to Face (F2F) technology training programs must ensure technology skill development provide rich extended experiences in technology integration, model effective practices and innovative uses of technology that improve teaching and learning and provide for experiential learning that will promote the transfer of training (Willis & Cifuentes, 2005).

Once the teachers had the skills, they could teach the skills and how to increase the learning because skill level no longer negatively impacted learning.

(O'Dwyer, Russell, Bebell, & Tucker-Seeley, 2005) found that:

while controlling for both prior achievement and socioeconomic status, fourth-grade students who reported greater frequency of technology use at school to edit papers were likely to have higher total English/language arts test scores and higher writing scores on fourth-grade test scores on the Massachusetts Comprehensive Assessment System (MCAS) English/Language Arts test.

The learning occurs through the doing and translates into observable acquired skills during assessment processes. This indicates the child's ability to tackle morehigher-order thinking skills activities and measuring instruments.

VIII. HIGHER-ORDER THINKING

Recognizing students build higher-order thinking skills through technology use, librarians, now called Learning Commons Managers, can tap that knowledge and assist students in their constructive research in libraries/Learning commons in schools. Teaching students the steps in the search process provides structure to searching the Internet that addresses bad search habits. Chunking, a common pedagogical term, is a practice that assists students with working through and with computer technology (Howe, 2002). Teachers all agree that learning is not confined to the classroom, and achievement happens wherever learning happens.

Several studies investigated the use of laptops in the classroom. They found that the electronic notebooks had several benefits, such as increasing students' motivation and collaboration, strengthening connections between disciplines, improving students' problem-solving skills, and promoting academic achievements (Kiaer, Mutchler, & Froyd, 1998; Mackinnon & Vibert, 2002; Siegle & Foster, 2001). For some students, those with learning difficulties, accessing higher-order thinking skills may take more time; however, through the individualized programming capabilities provided through technology integration in the curriculum, these students are not disadvantaged.

IX. TECHNOLOGY INTEGRATION AND MOTIVATION

SMARTtechnologies,as the name eludes, have built systems by which computer-based learning is enhanced. Kicielinsk (2005) says: "Students are highly motivated and enthusiastic about whatever topic the teacher presents with this technology. They love to present their ideas with a SMART Board interactive whiteboard to demonstrate what they know, which is that higher level of Bloom's taxonomy that we want to cultivate." It has been suggested that game theory, coding, and multimedia creation projects could assiststudents' intrinsic motivation and metacognitive opportunities. The use of interactive hardware and software engages the activity-based or kinesthetic learner and the deductive learner through the effective and planned use of technology .

When internally motivated, students can achieve what others perceive as capabilities. In Andrew's (2006) article, Tony Sambunjak states, "The motivation level of the students rose astronomically. The students could learn about a new tool, jig, or fixture in class, over lunch or in the evening, design a part on Mastercam's, come into the lab and create the part the next day by plugging the laptop into a milling machine. Instead of helping students increase their reading ability, the programs focus on moving students from level to level and receiving thanks for participating in awards (Chenoweth, 2001). Researchers who pursue knowledge, investigate a problem, and report on their findings include recommendations for future research. Various research designs exist, and these designs argue that a relationship between technology integration and achievement exists in some places, not others.

X. RESEARCH DESIGNS THAT DEMONSTRATE IMPROVEMENT

Researchers write journal articles, write doctoral dissertations, perform a meta-analysis, conduct literature reviews, and use quantitative, qualitative, mixed-method, ethnographic, case study, and quasi-experimental designs. In the future, new research designs may add new knowledge to a given topic; in this case, does technology integration

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improve academic performance. Examples of the literature reviewed for this paper section provide designs that investigate the relationship between technology integration and achievement.

Collins & Noblit (1978) noted:

> Field research better captures situations and settings which are more amenable to policy and program intervention than are accumulated individual attributes. Secondly, field studies reveal not static attributes but an understanding of humans as they engage in action and interaction within the contexts of situations and settings. Thus inferences concerning human behavior are less abstract than in many quantitative studies, and one can better understand how an intervention may affect behavior in a situation. (p. 26).

Obtaining rich descriptive language often fills in the picture outline created by quantitative statistical data. The narrative detail is usually passionate and captivating. This emotion of the relationship being investigated may be more fully realized in the language describing the interaction. This point is arguable. As Hamel,, DuFour, & Fortin (1993) observed, the case study has been faulted for its lack of representativeness… and its lack of rigor in the collection, construction, and analysis of the empirical materials that give rise to this study, this lack of rigor is linked to the problem of bias. .. introduced by the subjectivity of the researcher. (p. 23).

The mixed-method approach is often a compensation for the potential weaknesses in either quantitative or qualitative methods if conducted singularly. There still exists the argument from purists in both camps, quantitative and qualitative, for the use of either design, but the combination of the two models comes from the qualitative research design group.

Han (2007) conducted a comparative study using qualitative and quantitative methods to explore the differences between students using a geometer's sketchpad and students using traditional tools.

The quantitative and qualitative data study found a greater understanding of the properties and definitions of each type of quadrilateral and class inclusion relationships among the quadrilaterals. This was evident from data collected on the post-test and from the student interviews (Han,2007).

Han (2007) found the data consistent with many other researchers abouthigh-level skills. A major limitation to the study, as in comparative studies in the same place and time, is the lack of randomness in the sample selection; in addition, the length of time for this study was 14 days.Studies constructed using varied designs and new designs open the discourse on how best to research all aspects of learning, including computers.

Fortunately for researchers, problems exist. Otherwise, no work would be found. The method of data collection guides the research design. In simple terms, if random assignment is the chosen method, it is a randomized or actual experiment. If there is a control group or the design uses multiple measures, it is a quasi-experimental design. If the plan does not have multiple measures or no control group, it is a non-experimental design.

XI. CONCLUSION

A lack of data on the best design to use implies further ongoing study is required after reviewing the types of research conducted to demonstrate improved academic performance and varied forms of research that would fit the bill. The author proposes the action research model to shed light on specific models of technology used for particular learning environments. The many design approaches and the disagreements among researchers presented validates a clear understanding that there is no one size fits all design to research, just like there is no one way everyone learns. Although there is evidence to support both sides of the argument, with technology being an integral part of all aspects of society, it would do students a grave disservice if they were not educated with and through technology. This paper demonstrates that further research is needed to narrow the guidelines to assist researchers in choosing designs to delve deeper into problems. New designs should provide new knowledge about the issue and how to get a clearer understanding of the ontology of human interaction, not only with others but with technology systems.

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