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教育におけるテクノロジーの歴史と未来についての考え*

フレイク・リー**

Thoughts on the History and Future of Technology in Education

Lee FLAKE**

Introduction:

The long-term economic, political, and environmental impacts of the continuing coronavirus pandemic have yet to be revealed. As an educator, the author would like to take a look at the influence the pandemic has had on education systems. The author's institute of tenure has responded with online and blended learning as well as Computer Assisted Language Learning (CALL) models.

The author obtained his Master's degree in education curriculum and instruction and became versed on the evolution of education standards and curriculum design which enticed the author to expand his research to include the history of education. Granted, it is a Western approach that is dominantly presented as this is the environment that the author was educated in.

Chapter 1: Education and the Past:

Education is constantly evolving; however, the process is slow enough to not be immediately noticeable until one considers how changes that are most pronounced are generational. The education system is a relatively new phenomenon when taken in historical perspective. Rural communities where the author's grandparents were educated were composed of one-room school houses. The generation that were of the generation before the author's grandparents were not familiar with the concept of standardized education. A publicly funded school for the general public would have been an unknown concept to that generation.

An example that can be taken by looking at history is that the first Cuneiform tablets dated around 3200 BCE attest that writing has existed for about 5200 years but universal literacy or the concept that everyone should be able to read and comprehend text is less than 200 years old. Therefore, in all the time that writing has existed, it has only been in the last 3% of the history of writing that the general public being able to comprehend what was written to be a priority. Universal literacy being adopted by governments and society is a relatively new phenomenon. Public literacy in any society on the planet has remained for centuries a very restricted technology closely associated with the exercise of power. It was only from the Middle Ages that book production started growing and literacy among the general population slowly started becoming important in the Western World. In fact, while the ambition of universal literacy in Europe was a fundamental reform born from the Enlightenment, it took centuries for it to happen. It was only in the 19th and 20th centuries that rates of literacy approached universality in early-industrialized countries.

According to "Our World In Data" (2021) statistics, in 1820 only 12% of the population in the United States could read or write in their own native language. In 2021, it is closer to 85% of the population world-wide and close to 100% in most developed countries. Technology, population, food production, information has all increased exponentially in a very short amount of time when considering the history of our species. These advancements all coincide with

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** 鎮西学院大学　現代社会学部　外国語学科
Nagasaki Wesleyan University, Faculty of Contemporary Social Studies, Department of Foreign Languages

the moment that world societies placed value on education and determined that public education is a universal right.

Education has evolved with humanity. In the hunter/gatherer days, education was "play learning" much like animals teach their young survival skills, humans would also pass on survival skills to their offspring. Oral traditions and survival knowledge mingled with superstition and religion would have been passed down from generation to generation. What one can or cannot consume by recognizing poisons and danger would have been an essential life skill.

The Agricultural Revolution created more stability at the expense of free time. The trade was that the families would need the effort of every individual to sustain themselves. Markets and trade developed along with the Agricultural Revolution created a rudimentary need for basic math and language skills. Society quickly adapted a feudal system composed of wealthy land owners, serfs, and slaves. The wealthy land owners in control of the trade and monetary flow would have been those who were privileged to have a rudimentary education.

The surfs, slaves, and other working class during the Agricultural Revolution were merely concerned with how to work efficiently and self-preservation through survival. Formalized education during the Agricultural Revolution and middle ages would have only been available to the elite and privileged class of society. Egypt had a system of education that supported potential future pharos. Greece adopted a learning system for its elite that only educated males. The Greek had slaves to do the menial work while the elite were allowed time to think and philosophize. The term "school" is coined from the Greek word scholē meaning "leisure time". In other words, "school" refers "free time" in Greek referring to the time one had to think and ponder. In Greek society, slaves and working class were kept busy providing for themselves and the elite class while being denied such "school" time to think and contemplate. Ancient India was more inclusive as both males and females of the elite were allowed to be educated. Perhaps progressive for its time, ancient Aztecs provided education to its population regardless of class or gender, but decimated its lower class through ritual human sacrifices.

Education as only a possibility for educated and elite through the middle ages and was most commonly made available through the hiring of private tutors instead of a formalized place of study. Granted, institutes such as universities were established during this time, but this was also strictly only available to the elite male population. Oxford and Cambridge were established through revenue gained in the West through the opium trade. It was funded by the elite for the elite. Johannes Gutenberg and his invention of the printing press in 1440 as well as the Protestant reformation were key in the revisualization of education as this promoted the availability of reading material to the public. Until the revolution of the printing press, books were hoarded by universities and monasteries and only made available to a remote few privileged society members. Even if one had the ability to read, there simply was no material immediately available for one to read. The printing press is a prime example of how technology has changed education. Marin Luther made use of this technology to distribute his articles on free thought and critical thinking throughout Europe, challenging religious and societal dogma in his "95 thesis" in 1517.

Literacy of the public and not just the clergy was a major part of the Protestant reformation. The Lutheran church began opening schools throughout Europe as part of the Protestant reformation making more of the public literate. Although this is presented in a Eurocentric point of view, the same can be said of how education was controlled by the elite in Asian societies as well. It was considered part of the missionary effort of the West to bring education to Asia. This is also relevant to the Chinzei Academy as its history is that of a Methodist

mission institute.

Public schools in the United States can be traced back to 1639, but the agrarian southern states with its roots in the tutor system endorsed in Europe at the time was a standard that went unchallenged until after the Civil War. This serves as an example of education being withheld from minorities as slaves were discriminated against and denied achievement or advancement in society provided through education. It was the end of the 1800s when society adopted a tax-funded education system. Urban areas in general had more opportunity for education over rural areas as schools were more well-established in populated places. This was perpetuated by the fact the children in the rural areas were needed to help with farm work and were afforded less time to study. Only the wealthy could afford a tutor or to attend a boarding school. Education ended at 8th grade or at the age of 14 and then one returned to a life of farm work.

The Industrial Revolution at the end of the 1800s revolutionized education as it gave the working class more time to be able to pursue study. It has been argued by social scientists that it was not until the Industrial Revolution that humanity learned how to be human by people replacing human slavery with machines that could do work more efficiently. Humanity essentially made fossil fuel and machines the new slave and allow humans the time to be educated. However, the use of fossil fuel and the smoke stacks of factories and cars that mark the Industrial Revolution has created environmental issues that have plagued humanity. Humanity is a victim of itself as the current coronavirus pandemic can attest.

The Industrial Revolution supported education as more knowledgeable and skilled workers were needed for machines and maintenance. Engineers, mathematicians, scientists, doctors, teachers, and all kinds of skills were acknowledged as being necessary for society. The "high school" movement was a direct result of the Industrial Revolution's demand for more educated youth. This has also been argued to have a negative covert curriculum for schools to foster society to be more obedient factory workers by being able to sit for long periods of time doing menial tasks—the same environment one would experience on an assembly line.

Likewise in Japan, with the Industrial Revolution came militarization. Japanese education system ends at junior high school—this system has continued until modern times as high school is not part of 義務教育 or compulsory education and has created a business-like standard for high school education divided into national 国立, prefectural 県立, city 市立 and private 私立. This author believes that the Japanese compulsory education system was covertly created to foster disciplined and obedient soldiers. Classes begin with teachers or class leaders barking out commands 起立! 礼! 着席! "kiritsu!" "rei!" "chakuseki!". While American students are forced to pledge the allegiance as a covert method of establishing patriotism and/or nationalism, Japanese have this enforced in every class throughout their day. Japanese group-oriented mindset is also fostered in the standardized education system. Graduation does not acknowledge the individual; rather, it is the "class" or the "grade" that receives acknowledgment. Individual success is secondary to the success of the grade, team or school. Schools in Japan were part of the propaganda machine for the militarization of Japan and in many respects has remained unchanged since the end of World War II.

The author has had numerous examples of how nationalism and obedience over knowledge are still covertly fostered in the compulsory education system. The author's previous research on the Peace Education system brought light to how events of World War II are interpreted. His own experience of his child returning home from a Peace Education assembly with the remark "America is bad!" was very disheartening as this was a representation of what was being learned through "Peace Education". The author has

come to believe that the curriculum demands to be challenged. If the author's daughter had responded, "war is bad!" or "nuclear weapons are bad!" then some merit for the Peace Education curriculum could be acknowledged. To be offended is deemed as being overly-sensitive which is further offensive. The author's review of the visitor comment book at the Nagasaki Peace Museum revealed multiple comments by student visitors desiring revenge on America for dropping the bomb instead of academically debating the need to use the atomic bomb nor considering the events that led up to the use of the bomb. Remembering the bombing of Hiroshima and Nagasaki as the only events of the war creates a biased view of the war. As historian John Dower mentioned in his book "Embracing Defeat", this selective amnesia does not serve for the promotion of peace as the aggressor merely sees itself as the victim. This mindset has permeated the education system in Japan as presented during history textbook debate in the 1990s. This author believes that the debate was never resolved and has served to maintain a right-wing militaristic attitude in Japan that covertly exists under the surface of society.

Students in Japan are openly discouraged to counter their instructors which is also a manifestation of how obedience takes priority over knowledge. Students memorize names and dates with little attention nor discussion on historical events. Tests are composed of predetermined standardized responses that are limiting and controlling. The author has noticed exam problems that are heavily biased and do not take into account issues of semantics and cross-cultural interpretations.

Publically funded kindergarten through 12th grade education in the United States is literally less than 100 years old and many States did not join until after World War II. While "high school" was adapted as compulsory education in the United States, it was not in Japan. As technological advancements continued since the Industrial Revolution, one can see the correlation between the Industrial Revolution and educational reforms. This is all the more evident through the current coronavirus pandemic and both teachers and students all over the planet are compelled to embrace online learning.

Perusing new skills and knowledge should be an active endeavor of an educator's professional growth plan. Skills and knowledge include improving and applying one's technological proficiency. Such goals are an asset to the identity and skills of an educator. The author continues his learning and stays current on educational issues as well as technology trends in an effort to remain an effective instructor.

Chapter 2: Education and Pre-Modern History

After the Soviet Union launched Sputnik into orbit on October 4, 1957, there was a sudden profound interest in the United States to focus on improving science and mathematics achievement in public schools. The United States Congress quickly passed the National Defense Education Act with interest in using technology for enhanced and programmed instruction, and educational programs in the classrooms. Most all classrooms throughout the United States were soon equipped with screens for projectors and slides as Over-Head Projectors (OHPs) became standard for K-12 classrooms in the 1960s. This trend was soon followed by school media rooms equipped with TV monitors in the 1970s. Morrison and Lowther (2005) labeled this movement as Technology Type I and further explained technology introduction into classrooms from the 1960s until present as Technology Types I, II and III. Both Types I & II are delivery-based and focus on instructional strategies.

2.1 An Overview of Technology Types and the History of Technology in Education

Type I view of technology is that technology is used to enhance the role of the teacher as educators typically viewed technology as a more efficient means to deliver instruction to students (Morrison and Lowther, 2005). Slide

projectors enabled teachers to instruct classes more efficiently and with greater ease than writing on blackboards. Type I view of technology was an extension of the teacher—a way to amplify instruction. In short, it helped the teacher become a better instructor. The government authored and endorsed the new technology trend beyond the classroom to promote education through public television and educational programs. The Public Broadcasting Service (PBS) was founded in June 1970 in the United States. Educational programs were soon introduced in the United States. Mr. Rogers Neighborhood (televised from 1966); Sesame Street (televised from 1969); Curiosity Show (televised from 1972) soon renamed 321 Contact, all shared in popularity and also became cultural icons. Public television, which was already a standard in many countries, such as the British Broadcasting Company (BBC) and the Nippon Hōsō Kyōkai, (NHK) known in English as the Japan Broadcasting Corporation also followed suit with various education programs.

Technology Types, are generational and reflect paradigm shifts in learning philosophies. During the 1980s and 1990s, technology was viewed as a way to deliver instruction. Programmed or pre-programmed instruction became the norm for Technology Type II as technology was used to replace teachers instead of amplifying or enhancing the teacher's instructions (Morrison and Lowther, 2005). The author, as a child of the 1980s can remember vividly being in science or history classes that instruction was merely a matter of having students watch a documentary on Beta-max, VHS, or film strips for entire class periods with very little instruction from the teacher. Moreover, this was before the standards movement in education, making "bad science", biased information, and wrong facts an occasional blight on one's schooling. Many who grew up in the 1980s can remember viewing documentaries such as the 1958 Walt Disney documentary titled "White Wilderness" in which claimed that lemmings commit mass suicide. Many who grew up watching such reports and documentaries believed this to be true since it was being taught in a classroom.

In the 2000s and 2010s, technology came to be viewed as a tool. This view of technology is what uniquely separates Type III from previous views on technology. The role of students and teachers were changed as the teacher becomes a facilitator and students take on the active role of a researcher (Morrison and Lowther, 2005). Schools, institutes and teachers no longer have a monopoly on knowledge, information, and skills. Standards and accountability in education on both regional and international levels. As examples of the standards movement, in the United States, the No Child Left Behind (NCLB) legislation was introduced followed by the National Educational Technology Standards for Teachers (NETS-T), the American Council on the Teaching of Foreign Languages (ACTFL), and the National Center of Assessing General Curriculum (NLAGC). On a national level, the Programme for International Student Assessment (PISA) continues to provide a standard for assessing student academic performance.

While studying as a graduate student, the author began to consider that a Technology Type IV movement, which is characterized by the use of the technology to bypass schools, universities and other educational institutes, is perhaps the next technology type in the continued evolution of e-learning. Continuing the theories of technology Type I-III that Morrison and Lowther introduced, the author believes that a new Type IV movement is also worth considering. Online education is merely one example of Type IV technology. Type IV is emerging as students and others seeking professional development have discovered that through motivation and available resources, one does not need an institute in order to succeed at employment or to gain qualifications. Technology empowers the individual. E-texts are available making it possible, based on the motivation of the

individual, to receive licensure or credentials and acknowledgment for learning skills. Type IV has emerged through published e-texts and the availability of information through the Internet and through the advancement of mobile devices such as smart phones and tablet devices. These and other advancements in emerging technology give instant skills to the user. Engineers seeking apprenticeship, lawyers studying for the bar exam, and teachers looking for lateral entry into teaching licensure are all aided by online courses and e-texts over traditional courses and programs at brick and mortar institutes. Type IV technology challenges traditional educational institutes.

It is possible to pass skills and knowledge assessments without formally attending an institute. Ascribed status given to institutes is potentially a social construct. Although the author is not entirely convinced that online education and e-texts will quickly replace brick and mortar institutes as the "human element" has intrinsic value for learning, he believes that Type IV technology movement is challenging the traditional mindset of education standards.

Technology Types I and II are delivery-based. It is only when computers and technology are viewed as a cognitive tool that the use of technology becomes interactive as in Types III and IV. To effectively use technology as a tool is to use technology to determine, identify, summarize, and organize information. Please refer to the following table for an overview of the Type I-IV technology.

Table-1. The History of E-Learning and Technology in Education

Designation / Era	Philosophy Concerning Technology	Technology/Teacher Relation
Type I	1960s-1970s	provides efficient instruction	enhances teacher's role
Type II	1980s-1990s	provides programmed instruction	replaces teacher
Type III	2000s-2010s	a tool or artifact for knowledge	redirects role to facilitator
Type IV	2010s-present	empowers students to bypass institutes	limits teacher's role

Source: Morrison and Lowther (2005).

2.2 Author's Experience with Technology in the Classroom

Although the technology is now antiquated, the author was first introduced to technology in the classroom through the Native World® Computer Interactive Program (CIP) at the high school he was employed by before being tenured by the Chinzei Academy. The high school where the author was previously employed purchased new computers through donations and stipends received during their 80th commemoration. Purchased computers were used in an experimental Language Lab for grade 12 high school students. Through the Computer Interactive Program (CIP) for EFL instruction written by Nippon Hoso Kyokai 日本放送協会 (NHK) or the Japan Broadcasting Corporation titled Native World® 3.0, students were introduced to the latest technology for EFL study.

The program is simple and effective in application. The computer plays different scenes from daily life such as ordering food at a restaurant or taking a taxi. The students have to converse with the native English speaking characters on the screen. Each student sits at a computer with a head set and speak into a microphone that "reads" what they say. Acceptable responses are predetermined by the program. When the response is close enough in

dialect that the computer recognizes it, the student proceeds to the next "level." As the dialogs become progressively more difficult and responses become more scrutinized, students are encouraged to put their skills to the test. Students tend to remember vocabulary and new expressions quickly compared to standard lecture-style instruction of the material. Although students are only talking to a computer, the "characters" on the screen are live people creating a feeling of conversing with a native speaker. The dialogs and pronunciation are checked by the computer and a grade is given according to their work. Students must complete a determined level to have a passing grade for each day.

The Native World® program incorporates speech-to-text technology similar to Siri on smart phones. In recent years, speech-to-text and text-to-speech technology has advanced greatly. Tech writer Kevin Parrish (2012) introduces a new Microsoft speech translation program demonstrated by TED presenter and chief Microsoft® researcher Richard Rashid. The demonstrated speech-to-text technology is capable of not only converting spoken English into spoken Mandarin Chinese in real time, but keeps the user's voice intact as well through voice sampling technology (Parrish, 2012).This new technology fast and accurate and has great potential for aiding global conferences and facilitating communication in personal, political, and business environments. Collaborative role-play and differentiated instruction are supported through the use of computer-interactive EFL instruction program Native World®. Differentiated instructional approaches adapt in relation to individual and diverse students in classrooms providing multiple options for students to take information and make sense of ideas (National Center of Accessing the General Curriculum (NCAGC), 2002).

Students learned new English vocabulary and expressions through a method which conforms to the individual learning styles of the students whether visual, auditory, or kinesthetic. Addressing the diverse needs of all students by using learner-centered strategies is recognized by NETS-T standards.

Chapter 3: Thoughts on Technological Proficiency

Technology skills now include a variety of electronic instructional strategies. Computer Assisted Language Learning (CALL) models are introduced through the advent of technology. Although not all educators are knowledgeable about the latest computer and electronic technology, teachers should have confidence to learn new skills and take pride in one's ability to adapt.

During the author's lifetime, the world has changed from analog to digital. Changes continue to happen daily and keeping up with the latest technology is a challenge, but educators should not feel intimidated about learning new things. Technology is kryptonite to educators who prefer more traditional methods of instruction. There is an ability gap among educators since everyone is a product of their environment and/or personal dispositions. Perennial Type I or Type II educators can be found in many classrooms. Some educators might feel that technology downplays their skills or do not want to relinquish power of instruction. Other educators only view technology as a method to enhance classroom instruction. However, it is how the technology is managed that determines its success in the classroom. Interaction or the "human element" is important. Reflection, debate, exploring information collectively and sharing is what creates learning moments.

Technology is merely a tool—an artifact to aide human cognition. Throughout the history of humanity, artifacts have been used to help us improve our thinking process. Mnemonic or mental artifacts helps one remember, file and process information (Morrison and Lowther, 2005). Physical artifacts used for cognition include watches, pencils, paper, calculators, computers and, of course, smartphones. We

invent new artifacts to help us improve our thinking process. With modern technology, mobile devices such as iPads, PDAs and smart phones, with their wide range of built in functions make traditional methods seem ancient. However, from an anthropological perspective, it is merely the artifact that has been updated and the perennial need to process information has remained the same.

Technology supports higher-order thinking. This merit alone has made the author an avid supporter of e-learning. Higher-order thinking includes Bloom's Taxonomy, Critical Thinking, Creative Thinking, and Meta-cognition. Each of these theories should be considered when debating the value of technology in education. Higher-order thinking is described as any activity which requires students to process information in meaningful ways (Morrison and Lowther, 2005). Higher-order thinking is described by hypothesizing, planning, classifying, synthesizing, elaborating, evaluating, analyzing, contrasting, modifying, and finding sequences. This higher-order thinking is the back story for online lesson design model was developed in response to the Internet and technology advancements in education.

Through online instruction, the roles of the teacher and student are altered. The instruction design is student-oriented meaning that students are empowered and take on the role of a researcher whereas teachers assume the roles of designer, manager, and facilitator (Morrison and Lowther, 2005). Effective e-learning lesson plans are examples of problem-based, project-based, or inquiry-based learning that implements technology and fosters learning.

The Computer Assisted Language Learning (CALL) models endorsed by Chinzei Gakuin University is the "Surala" program created in 2016 (https://suralajuku.jp/) and used extensively for the standard or **基盤** "kiban" courses at the university by students in both the English and Japanese language programs. The author feels that the advantages of the Surala® program is that it is accessible to educators and provides a quantitative assessment for student performance based on tasks assigned through the program. Disadvantages are that the program does have occasional content errors or acceptable answers that are not deemed correct due to issues of semantics. Moreover, students who are challenged have difficulty proceeding through the program as students may only advance through the program as the tasks are properly completed. Students who are less challenged simply advance more quickly through the tasks. However, the various tasks and drills provide an opportunity for all students to learn while teachers as facilitators of the program are provided instant progress reports and quantifiable reports on student academic performance.

The CASEC® exam (https://casec.evidus.com/) is also used as a measure for academic skill and as a placement exam for students at Chinzei Gakuin University. CASEC is an acronym for "Computerized Assessment System for English Communication" and is described as an adaptive-type test for evaluating English language proficiency. The CASEC test is based on the fundamental research done by The Society for Testing English Proficiency, Inc. The CASEC exam score enables teachers to properly assign students to classes based on skill level. The exam also provides a measureable assessment for student performance. By adjusting the difficulty of the questions in accordance with the correct and incorrect answer to preceding questions, the CASEC test can accurately evaluate English proficiency and ability. The CASEC test also enables instructors to view corresponding scores of TOEFL, TOEIC, EIKEN, etc. According to the CASEC Examinee Manual, it takes 40~50 minutes to finish the test. The test contains four sections to test proficiency. The maximum score per section is 250 with a cumulative score of 1000 points for the entire exam.

Conclusion

Educators should have an understanding of technology and have a variety of technical skills. Teaching will always require the "human touch" of the instructor and overuse of technology can isolate the student; however, when effectively used in conjunction to the teacher's lesson, technology can enhance the material being learned. Although technical skills are important, teachers should have a variety of skills besides technical skills in order to be an effective educator. The most effective teachers are those who truly enjoy the work and have deep concern for their students. Highly skilled instructors often possess an innate aptitude for teaching. These are characteristics which the author hopes to foster as he continues his studies and work as an educator. Technology skills now include a variety of electronic instructional strategies. Various online resources including MS Teams®, Google Classroom®, Zoom®, and Google Meet® as well as Computer Assisted Language Learning (CALL) models such as the Surala® program and CASEC exam currently being used by Chinzei Gakuin University are introduced through the advent of technology.

Engineering knowledge has a half-life of five years which means that information and concepts that a student learns as a freshman may become obsolete by the time they are seniors. By having computer and electronic media skills and an understanding of programs, even if the format and media becomes outdated, the basic concepts can be used in a limited sense in newer versions.

The author feels that the e-learning design is an effective method for supplementing instruction. E-learning will continue to change as technology continues to advance. The author feels that it is important for educators to consider the benefits of adopting technology into their instruction strategies. E-learning through CIP programs such as NativeWorld®, Surala® and CASEC® serve to promote individualized learning through a method which conforms to the individual learning styles of the students whether visual, auditory, or kinesthetic. Surala® and CASEC® use computers as a tool for assessing language proficiency and encourages self-study and higher-order thinking.

Knowledge of modern assessment practices and technology can help educators conform to the needs of their students. Technology provides effective assistance for instructing and assessing student academic performance. Effective educators are those who have skills, knowledge, and are well-versed on various educational theories and practices as well as possess an aptitude for teaching.

References

American Council on the Teaching of Foreign Language (ACTFL), 2013. Language Acquisition Theories and Instructional Practices. Retrieved October 25, 2017 from https://www.actfl.org/.

Answers with Joe. YouTube Channel. Retrieved May 15, 2021 from https://www.youtube.com/watch?v=VSiQCL3oBj8.

CASEC (Computerized Assessment System for English Communication (2021). Retrieved June 30, 2021 from https://casec.evidus.com/.

Clark, F.T., 1998. Integrating technology into the classroom: A teacher's perspective. TechTrends, 43(2): 45-46.

Ikpeze, C., 2006. Connecting the bits: Inquiry-based learning, the world wide web and literacy acquisition in an urban fifth grade classroom. Doctoral Dissertation, State University of New York, 2006. Dissertation Abstracts International, 67/03, 883. UMI No.3213619.

Kim, T., 2006. Impact of inquiry-based teaching on student mathematics achievement and attitude. Doctoral Dissertation, University of Cincinnati, 2006. Dissertation Abstracts International, 67/04, October 2006. UMI No. 3218047.

Lowther, D.L. and G.R. Morrison, 1998. The NTeQ model: A framework for technology integration. TechTrends, 43(2):33-38.

Morrison, G.R. and D.L. Lowther, 2005. Integrating computer technology into the classroom. 3rd Edn., Upper Saddle River, NJ: Pearson Education, Inc.

National Center of Accessing the General Curriculum (NCAGC), 2002. Differentiated Instruction: Effective Classroom Practices Report.

National Educational Technology Standards for Teachers (NETS-T), 2008. From International Society for Technology in Education (ISTE). Retrieved October 25, 2018 from http:// www.huayuworld.org/oldindex/wp-course/100_course/04/ download/expand__NETS_T_2008.pdf.

Our World in Data (2021). Illiterate and Literate World Population. Retrieved May 16 2021 from https://ourworldindata.org/literacy

Parrish, K., 2012. New microsoft tech translates speech in near real time. Tom's hardware, the authority on tech site. Retrieved July 24, 2018 from http://www.tomshardware.com/news/Deep-Neural-Networks-DNN-Microsoft-Research-Rick-Rashid-speech-to-speech,19047.html.

Ross, S.M., G.R. Morrison, D.L. Lowther and R.T. Plants, 2000. Final Evaluation Report of the laptop Program.

Surala (2021). Education Program for Institutes Retrieved May 16, 2021 from https://suralajuku.jp/?utm_source=google&utm_medium=cpc&utm_campaign=syamei&gclid=Cj0KCQjw4v2EBhCtARIsACan3nxkWsCZBjhpCE0xYHcZQXSZJtqHoVXsEpAbOGpECombjxQZHx5ny0caAq8aEALw_wcB

University of Phoenix, 2005. Instructional design notes. University of Phoenix rEsource. Retrievedfrom http://ecampus.phoenix.edu/secure/resource/resource.asp.

University of Phoenix, 2008. Integrating educational technology in the classroom course syllabus. University of Phoenix rEsource. Retrieved August 26, 2015 from http://ecampus.phoenix.edu/secure/resource/resource.asp.