

Education Technology and the Digital Aptitude Divide

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Abstract

This paper explores various views of education technology and the digital aptitude divide, and it proposes a solution to address the digital aptitude divide. After a brief introduction, the paper provides a literature review that serves as a survey of literature discussing education technology from 2001 to 2017. After the literature review, the paper moves on to a chapter on diversity and ethics which considers the problems associated with technology from an ethical and cultural standpoint. Included in the diversity and ethics chapter are comments on Hofstede's Principles. After the diversity and ethics section, the paper states the problems associated with education technology and proposes a solution to those problems. The proposed solution consists of a new method of curriculum development and delivery which would require additional research and funding to implement.

Keywords: Education, technology, culture, ethics, diversity, Hofstede, curriculum.

Education Technology and the Digital Aptitude Divide

Technology is infiltrating classrooms around the world, and it affects everyone in those classrooms. Because of the impact education has on people's quality of life, there is a moral obligation to ensure the fair implementation of education technology. Technology will only improve lives if those who implement it account for cultural values and global inequity.

Battersby (2017) said that because today's students grew up with technology, teachers must incorporate new strategies that engage them (p. 118). However, Boser (2013) stated that schools continuously fail to employ technology in meaningful ways (p. 2). Educators must do more than apply technology as a tool to maintain student interest. Selwyn and Facer (2014) observed that technology might exacerbate boundaries related to socioeconomic status (p. 488). Education technology must lessen divides rather than exacerbate them, and its success depends on how educators apply it.

Technology plays a critical role in today's classrooms, but there is a disparity in the benefits people receive from it. While technology has the potential to remove boundaries, it also has the potential to divide people. Adding technology to classrooms without clear measures of success is unlikely to help students, and the addition of it to classrooms without considering individual student and teacher cultural values increases the likelihood that it will fail. This paper identifies the benefits and problems associated with education technology; it presents an overview of the diversity and ethical concerns associated with education technology, and it makes recommendations to increase the probability that all students, regardless of socioeconomic status or cultural background, can benefit from the enhanced education that technology offers.

Literature Review

Lyons (2017) described educational technology's disruptive potential and noted that

future learning networks would shape education's future (p. 54). Thirteen countries across the Asia-Pacific region, Europe, and North America define E-learning as using information and communications technology to enhance learning (Guri-Rozenblit, 2009, p. 9). Ghemwat (2017) noted that online enrollments have continued to increase even as overall higher-education enrollments have decreased since 2010 (p. 57). Technology promises to bring education to a higher number of people, and its popularity is increasing even as traditional enrollments in higher education decline. Technology has the potential to enhance learning, but it faces barriers. Educational technology to reaching its potential requires identification of its barriers to support the identification of ways that neutralize digital divides.

Digital Divides

Digital divides can be broken down into three states, a first level known as the digital access divide, a second level known as the digital capability divide, and a third level known as the digital outcome divide (Wei, Teo, Chan, and Tan, 2011, p. 171). Digital access refers to people's abilities to access technology, whether at home or school. Digital capability refers to people's ability to utilize technology. Digital outcome refers to the impact of technology. Research into digital divides typically approaches the causes of those divides from generational perspectives and perspectives of socioeconomic status.

Conceicao (2016) noted that today's learners are made up of different generations who use technology in different ways (p. 56). Battersby (2017) said that Millennials differ from previous generations and that old teaching strategies are less effective (p. 124). Millennials can be described as digital natives, while older generations can be described as digital immigrants (Conceicao, 2016, p. 57). However, not all researchers agree with the idea that Millennials are different from previous generations. Bennett, Maton, and Kervin (2008) said that claims that

education must change to cater to digital natives rely on arguments without empirical evidence (p. 783). Ruth, Dobson, and Petrina (2008) cited a study in which tests revealed no significant difference in the scores of digital natives and immigrants (p. 251). Generational divides may influence the effectiveness of education technology, but there are other sources of division that warrant consideration.

Selwyn and Facer (2014) noted that there are “inequalities and injustices associated with the use of technology” that are determined by socioeconomic status (p. 489). Selwyn and Facer (2014) cited two studies, Czerniewicz and Brown’s 2013 study of South African university students and Lu and Straubhaar’s 2014 study of Latin American college students in Central Texas, which revealed subgroups of different ethnicities with different levels of the technical skills that are valued in academic environments (p. 489). Harris, Straker, and Pollock (2017) stated that family income, parental education, and parental job category determine the likelihood that children will have access to computers at home, and internet access can drop from as high as ninety percent of upper-income homes to forty percent of lower-income homes (p. 2).

Socioeconomically challenged students from households that do not own computers are likely to be less adept at utilizing technology in an educational setting. However, access is not the only defining factor in technological aptitude. Bennett, Maton, and Kervin (2008) noted that the way children use the internet differs based on age and socioeconomic background, and technology skills are not universal across generational lines (p. 778). Both availability and common methods of use impact students’ abilities to benefit from technology.

Benefits and Challenges

The benefits students can receive from technology are directly related to how effective teachers are at implementing it. Kozma (2003) stated that students do better at solving problems,

managing data, and communicating when teachers use technology to collaborate with others, and technology improves students' abilities related to research, analysis, problem-solving, product design, and self-assessment (p. 13). Battersby (2017) reported that students obtained higher test scores when exposed to innovative teaching methods (p. 121). Aided by technology, transnational education is widening learning opportunities by giving citizens more choice, offering innovative programs that challenge traditional education systems, increasing competition, diversifying education, and linking developing countries to prestigious colleges (Guri-Rozenblit, 2009, p. 104). Joseph (2012) stated that technology could connect multiple groups, is cost-effective, is easily updateable, and can be used anywhere (p. 431). However, education technology does face challenges.

Guri-Rozenblit (2009) cited a study that examined data from thirteen countries to conclude that while some faculty resisted educational technology due to their perceived limitations of it, their resistance can also be attributed to lack of training and lack of time to implement it (p. 20). Brabazon (2002) noted that from a cost perspective, internet-based education should make universities cheaper to run by lessening teacher work hours, but teachers must continue to run traditional programs while devoting additional time to online units (p. 8). Cuban (2001) wrote that in addition to costs associated with infrastructure, there are also costs associated with repair, upgrades, and training to use upgrades (p. 17). Guri-Rozenblit (2009) wrote that the impact of technologies on countries depends on their economic wealth (p. 69). Joseph (2012) wrote that regardless of increases in technology, financial constraints related to constant upgrades and leadership challenges will hamper its effectiveness, especially in developing countries (p. 429).

Summary

There is general agreement among the previously cited sources that technology is impacting classrooms. There is also agreement that a digital divide exists. Some researchers have focused on the generational aspects of the digital divide. Learners today use technology in different ways, and this demands new teaching strategies (Conceicao, 2016, p. 56; Battersby, 2017, p. 124). Some researchers disagree that generation is the primary determining factor in where the lines of the digital divide form (Bennett, Maton, and Kervin, 2008, p. 783; Ruth, Dobson, Petrina, 2008, p. 251). There is also evidence that the source of the digital divide is socioeconomic (Selwyn and Facer, 2014, p. 489; Harris, Straker, and Pollock, 2017, p. 2; Bennett, Maton, and Kervin, 2008, p. 778). Technology can increase student performance (Kozma, 2003, p. 13; Battersby, 2017, p. 121). It also offers students new opportunities and exposure to more learning institutions (Guri-Rozenblit, 2009, p. 104; Jones, 2012, p. 431). Technology offers the potential of numerous benefits, but it also presents challenges. Faculty may resist its implementation for various reasons, it may fail to reduce costs as expected, and the costs of maintaining infrastructure for education technology may keep it out of reach of less developed countries (Guri-Roenblit, 2009, p. 20; Brabazon, 2002, p. 8, Cuban, 2001, p. 17). The current problem with education technology is that while it helps some people, it harms others. Now that there has been a literature review of articles related to education technology, this paper will address the diversity and ethics issues that interact with technology in classrooms.

Diversity and Ethics

Cultural differences influence the potential of students to maximize the benefits of education. Hofstede, Hofstede, and MinKov (2010) noted that despite suggestions that technology brings people together, it does not overpower culture, and no matter how globalized

machines become, the minds of people remain the same (p. 391). To implement education technology ethically, its proponents must consider cultural differences.

Cultural Perspectives and Inequities

Education technology impacts numerous entities. Brabazon (2002) stated that the digital environment has the potential to allow marginalized groups to express themselves, but in reality, it grants those already empowered a means to further their narratives (p. 60). Also, Millennial learners have experienced technology in different ways than older generations (Battersby, 2017, p. 124). If new generations are more adept at technology, then educators who fail to consider the aptitude of older generations risks placing them at a disadvantage. Selwyn and Facer (2014) stated that injustices tied to education technology flow from socioeconomic status based on educational background, age, race, gender, class, and nationality (p. 489). Bennett, Maton, and Kervin (2008) noted that socioeconomic background influences how children use technology (p. 778), and Harris, Straker, and Pollok (2017) stated that individuals of lower socioeconomic status use technology for entertainment rather than improving academic skills (p. 9). Conceicao (2016) divided people into digital natives and digital immigrants and observed that immigrants traversing the world of technology face challenges similar to “a foreign immigrant moving to a new country” (p. 57). The lines that divide digital natives and immigrants also exist along cultural lines. Selwyn and Facer (2014) noted that some ethnic subgroups do not possess the technical skills valued in higher education (p. 489). Throwfeek and Jaafar (2012) stated that cultural factors influence the acceptance of e-learning systems by instructors (p. 961), and they also influence how students adapt to an e-learning environment.

Whether caused by cross-cultural differences, ethnocentrism, cultural inequities, in-group favoritism, or out-group bias, different individuals receive different treatment. Hofstede,

Hofstede, and MinKov (2010) stated that intercultural encounters may occur between local teachers and foreign students or expatriate teachers and locals and that “different value patterns in the cultures from which the teacher and student have come are one source of problems” (p. 393). Throwfeek and Jaafar (2012) noted that cultural dimensions vary depending on “ethnicity, language, gender, and other organizational factors” (p. 966). Boser (2013) stated that technology could link students to the most effective teachers regardless of geographic distance (p. 3), but it must also account for cultural differences. Hofstede, Hofstede, and MinKov (2010) noted that in-group and outgroup biases based on familial influences will continue at school, and subgroups are formed based on ethnic and clan backgrounds (p. 118).

Hofstede’s principles. Hofstede, Hofstede, and MinKov identified metrics to measure cultural values. Those metrics are “power distance, collectivism versus individualism, femininity versus masculinity, and uncertainty avoidance, . . . long-term versus short-term orientation, . . . [and] indulgence versus restraint” (Hofstede, Hofstede, and MinKov, 2010, p. 31-45). Understanding these metrics is necessary to avoid marginalizing cultures and groups with education technology.

Hofstede, Hofstede, and MinKov (2010) noted that high power distance societies believed in not aspiring beyond one’s rank and practicing moderation; in contrast, low power distance countries valued adaptability and prudence (p. 63). The middle-class exercises control over education, and because the egalitarian values of the middle class are different from the high power distance values of lower classes (Hofstede, Hofstede, and MinKov, 2010, p. 64), any failure to account for these differences risks marginalizing lower class individuals. Power distance is not the only consideration.

Another consideration is collectivism versus individualism. While individualists view a

diploma as an achievement that improves self-worth, collectivists view it as a ticket “to associate with members of higher status groups” (Hofstede, Hofstede, and MinKov, 2010, p. 118).

Knowledge of the differences between individualists and collectivists is necessary to develop a curriculum that does not marginalize either group. For example, collectivist students are less likely to speak up unless called upon directly, but “creating small subgroups is a way to increase student participation” (Hofstede, Hofstede, and MinKov, 2010, p. 117-118). Other also metrics warrant consideration.

Another metric measures masculinity versus femininity. Throwfeek and Jafaar (2012) stated that in feminine culture, decisions to implement new systems are influenced by group members, while masculine cultures make decisions based on “rewards, recognition, training, and improvement” (p. 966). A culture’s masculinity or femininity must be accounted for when seeking staff acceptance of new e-learning practices. From a student perspective, feminine culture tends to hold that passing is enough, while masculine culture produces students that seek more visibility in class and compete openly with other students (Hofstede, Hofstede, and MinKov, 2010, p. 160). Students may respond to education technology differently depending on how masculine or feminine their values are. Acceptance of education technology also depends on another metric.

Throwfeek and Jaafar (2012) noted that individuals from cultures with high uncertainty avoidance feel uncomfortable with new systems and attempt to avoid them (p. 965). Throwfeek and Jaafar (2012) also wrote that in high uncertainty avoidance groups, 98% of respondents stated management expects them to follow procedures, “and 100% of them needed standard operating procedures to enable them to accept an e-learning system. 73% of them mentioned that fear of failure is the primary reason to avoid a new system” (p. 965). Hofstede, Hofstede, and

MinKov (2010) said that German students prefer precise objectives and detailed assignments with strict timetables, while British students preferred “vague objectives, broad assignments, and no timetables at all” (p. 204). These different learning styles illustrate differences that administrators must take into consideration for e-learning development and delivery. Two additional metrics may impact learning styles.

The fifth metric is long-term versus short-term orientation. Hofstede, Hofstede, and MinKov (2010) noted that higher long-term orientation scores correlated to higher scores in math and science even when eliminating the effect of national wealth (p. 262). Cultures that foster higher long-term orientation scores warrant curriculum designed to capitalize on their higher aptitude for math and science, while cultures that foster lower long-term orientation scores warrant curriculum designed to help minimize the gaps between them and their more adept counterparts. The final metric is indulgence versus restraint. As national wealth increases, the indulgence index also tends to increase, while those living in poverty tend to lean more towards the restraint metric (Hofstede, Hofstede, and MinKov, 2010, p. 287). Education technology must provide a curriculum that appeals to both ends of this cultural spectrum.

Perspectives vary depending on individual values, and these perspectives determine perceived inequities. Individuals who score high on power distance may struggle in a less structured learning environment, while those who score low on power distance may chafe under the restrictions of a more structured environment. Power distance affects other metrics; large power distance cultures may be collectivist while small power distance cultures tend to be individualist (Hofstede, Hofstede, and MinKov, 2010, p. 103). New groups form readily in classrooms of individualists, while collectivists tend to stick to familiar groups and even expect preferential treatment if the teacher is of the same ethnic or family background; additionally,

collectivists will avoid conflict (Hofstede, Hofstede, and MinKov, 2010, p. 118). Classroom environments that challenge perceived cultural norms result in perceptions of inequity. These concerns of culture and inequity have ethical implications.

Ethical Implications

It is reasonable to assume that people try to make ethical choices. In applying actions to help education, outcomes can be good or bad. Continuing to make the same decisions despite adverse outcomes could be considered unethical. To date, actions taken in regards to implementing education technology have had mixed results. Bennett, Maton, and Kervin (2008) noted that educators have reacted to divides between digital natives without empirical evidence (p. 783), and Ruth, Dobson, and Petrina (2008) cited a study that showed no significant difference in information and communication technology test scores between digital natives and immigrants. Administrators may be throwing money and technology at a problem without clearly defining it. Universities have also connected with other universities via international partnerships, and they have used technology to diversify education and give students more choices (Guir-Rozenblit, 2009, p. 73). Unfortunately, cultural differences have not been a primary consideration in applying education technology as a bridge for the digital divide. Hofstede, Hofstede, and MinKov (2010) wrote “we cannot change the way people in a country think, feel, and act by simply importing foreign institutions” (p. 24).

Social Justice Theory holds that decisions which increase equality are right. A new division of societal disadvantage centers on the information-rich versus the information-poor (Brabazon, 2002, p. 174). If education technology is to be ethical by social justice theory, then it must help the information poor by narrowing the digital divide. Education technology could level the playing field between digital immigrants and digital natives and overcome cultural

barriers. However, Boser (2013) noted that high poverty schools receive less funding than wealthy schools, and this has created situations where black and Latino students are academically two years behind white students of the same age (p. 6). Unequal funding increases inequality and reinforces the divides between the information rich and information poor. If education technology is to be applied fairly, it must narrow divides and increase equality. Hofstede, Hofstede, and MinKov (2010) note that the majority of countries have conceived laws that treat people equally regardless of wealth and power, and the Christian Bible's praise for poverty and Marx's pleas for the proletariat illustrate the universal desire for equality (p. 54). Delivering the equality that Social Justice Theory demands is an end that serves the greater good.

Utilitarianism focuses on end results and the greater good. Koivusilta, Lintonen, and Rimpela (2007) observed that adolescents who exploit technology for information utilization rather than entertainment were more likely to achieve better prospects in adulthood (p. 100). Harris, Straker, and Pollok (2017) stated that television and computer gaming link to decreased performance in "reading, written expression, and mathematics" and educators must use education technology to bridge the gaps created by nonbeneficial home use (p. 121). In addition to helping students succeed academically, the inclusion of technology has a more immediate effect on student happiness. Throwfeek and Jaafar (2012) wrote that students prefer e-learning due to accessibility, availability, and flexibility (p. 962). Additionally, Battersby (2017) noted that test scores have revealed that groups taught with more innovative methods achieve improved learning (p. 121). Wei, Teo, Chan, and Tan (2011) noted that education technology leads countries to become more proficient in technology thereby reducing digital divides and increasing "the well-being of the populace in countries and societies" (p. 184). Utilitarianism demands that administrators apply education technology in a way that achieves these positive

ends.

Virtue Ethics focuses on intent. According to virtue ethics, individuals should strive to make moral choices. If, as Brabazon stated above, there is a division of disadvantage related to information rich and poor, then any actions which aim to bring information to those who are lacking are ethical. Cuban (2001) cited a project that aimed to increase technology use in classrooms and included a “TechnoKids component” that provided students with computers to take home (p. 185). This policy was ethical in its aims. Unfortunately, the policy did not account for differences in home use, and the computers were not distributed evenly across the student body. Cuban (2001) noted that as of the project’s third year, only three hundred students had received computers, out of 4,400 classrooms participating in the project (p. 187). This example demonstrates how policy can appear ethical on a macro level, but when viewed from a micro level, the policy becomes unethical due to inequity. There is another area viewable from the macro and micro level, and that area is economics.

Economic justice deals with the application of economic theory in ways that increase equality by providing individuals with the tools that they need to live productive and happy lives. Because of the role that education plays in the ability of individuals to succeed from an economic perspective, education technology impacts the ability of a society to achieve economic justice. Koivusilta, Lintonen, and Rimpela (2007) stated that technology use which improved information utilization skills led to better socioeconomic and educational prospects while use for entertainment purposes has opposite effect (p. 100). Economic justice and education impact each other, so while education technology can aid society in achieving economic justice, policies promoting economic justice must exist for positive outcomes from education technology to occur. Harris, Straker, and Pollock (2017) said that income impacts the likelihood of children

having home computers, and education, parental job category, and access to the internet drops from as high as ninety percent for upper-income homes to forty percent for lower-income homes (p. 2). Guri-Rozenblit (2009) wrote that the impact of technologies on countries is determined by their economic wealth (p. 69). Economic wealth, in turn, impacts the availability of those technologies. Economic justice must always be a consideration when considering how best to apply education technology.

Bennett, Maton, and Kervin (2008) stated that we need a shift in education that emphasizes “student knowledge creation, problem-solving, and authentic learning” (p. 782). Kozma (2003) stated that students perform better at problem-solving, managing information, and communicating when technology is present in classrooms (p. 13). Brabazon (2002) said that technology was only useful when applied with proper context under the guidelines of education theory (p. 69). Boser (2013) said that teachers do little to personalize lessons to individual students, but technology has the potential to tailor lessons to individuals (p. 3). Conceicao (2016) said that learning environments must be user-friendly for digital immigrants and dynamic for digital natives. Hofstede, Hofstede, and MinKov stated that cultural adaptation is better achieved when the curriculum is offered in students’ native language (p. 393). Policies and practices that incorporate technology into classrooms have the potential to lesson divides and increase learning if they are applied ethically.

Summary

Educators must consider cultural differences if they are to implement education technology ethically. Different groups are affected by education technology, and there are numerous metrics to consider to implement education technology in ways that lesson divides and decrease the marginalization of disadvantaged groups. Hofstede, Hofstede, and MinKov (2010)

stated that “communication technologies will not by themselves reduce the need for intercultural understanding” (p. 392). If applied with intercultural understanding, education technology has the potential to improve learning globally. Now that there has been a description of the diversity and ethics issues associated with education technology, this paper will propose a solution to solve these issues.

Proposed Solution

The solution to the challenges of education technology is multifaceted and involves a new method of curriculum development and delivery. The digital divide is the major problem that education technology has the potential to correct or exacerbate, and an understanding of the digital divide is needed to implement education technology in ways that produce desired outcomes. Additionally, implementers must realize that narrowing the digital divide will be an ongoing struggle, and metrics of success will be measured over the academic lifetimes of students. Technology continues to evolve, and if individuals are not continually progressing, then their stagnation will increase their relative divide to others and create a regressive effect. To state a solution, one must define the problem. The problem that education technology must address is a digital aptitude divide created by generational, socioeconomic, and cultural factors that combine with a never-ending evolution of technology, and the solution is a method of curriculum delivery that considers these factors.

The Digital Aptitude Divide

Battersby (2017) stated that modern students require new learning strategies (p. 118), while Bennett, Maton, and Kervin (2008) said that there is a lack of empirical evidence proving there are differences in aptitude based on generation (p. 251). The argument that digital aptitudes involve more than generational divides has merit, but the idea that exposure to

technology creates familiarity and increases aptitude also has merit. The middle ground between these differing views is that modern students have been exposed to different technology than previous generations, and the resulting familiarity may be a factor impacting their aptitude with technology. Familiarity with technology influences receptivity and that receptivity allows one to be influenced by education delivered via technology. Generational factors impact the digital aptitude divide, and specific curriculum is required to address this divide.

Guri-Rozenblit (2009) cited several studies administered by private entities, and the World Bank that determined no matter how much technical infrastructure development occurred in Africa, digital divides between its nations and others would only increase unless there was also development in human resources (p. 76). Though the problem is more pronounced in the developing nations that make up Africa, the same theory applies to individuals in developed nations. The technology that exists today will be obsolete tomorrow. Today's digital natives will be tomorrow's digital immigrants. Curriculum must bridge gaps between old and new technologies, and the education technology that will make use of emerging technologies must be self-teaching, and it must provide a means to narrow digital aptitude divides. Additionally, it must do so in a cost-effective way that does not place its curriculum out of reach for those impacted negatively by the next aspect of the digital aptitude divide.

The next aspect of the digital aptitude divide is the socioeconomic divide. This area impacts access to technology, and it impacts how individuals use technology. Internet use differs based on age and socioeconomic status (Bennett, Maton, and Kervin, 2008, p. 778), and this likely plays a role in apparent differences in aptitude observed along the generational aspect of the divide. To narrow the socioeconomic aspects of the digital aptitude divide, education technology must be applied to deliver curriculum in a format that counters the differences in use

across different socioeconomic planes. Unfortunately, education technology is often delivered in ways that increase this divide rather than narrow it; for example, Boser (2013) described how forty-one percent of math students from higher poverty clusters use computers for drill and practice while only twenty-nine percent of students from wealthier families use computers for drill and practice (p. 2). Simple drill and practice exercises are associated with worse performance than exercises that use education technology in ways that engage students' critical thinking and problem-solving skills (Joseph, 2012, p. 435).

To narrow the socioeconomic aspect of the digital aptitude divide, education technology must engage students and instill practices in use that they are not learning at home. Harris, Straker, and Pollock (2017) noted that up to ninety percent of upper-income homes have computers, while only forty percent of lower-income homes have the same (p. 2). Wei, Teo, Chan, and Tan (2011) stated that school computing access is not enough to close the divide created by this disparity, and individuals without computer access at home underperform students who do have computer access at home (p. 182). However, current curriculum is delivered in a single format that is not tailored to individual student needs. Modular lessons delivered to address the weaknesses of underprivileged students and designed to narrow the divide between them and their wealthier peers might reverse this trend of underperformance. Whether a division in performance is caused by a lack of previous access due to generational gaps or a lack of access caused by wealth gaps, the solution is to apply education technology to deliver curriculum explicitly designed to narrow those gaps. However, any curriculum that is to narrow the digital aptitude divide must also consider cultural differences and how they impact acceptance of and aptitude in technology.

The final aspect of the digital aptitude divide is cultural, and it may be the most

challenging to address. The cultural divide impacts relationships between teachers and students, and it impacts whether education technology is accepted or its curriculum is effective.

Technology may cross geographic boundaries, but it must also address culture (Boser, 2013, p. 3). One challenge is that the middle-class exercises the majority of control over education, and middle-class students display different cultural values than students from other socioeconomic classes (Hofstede, Hofstede, and MinKov, 2010, p. 64). Individuals developing curriculum must account for these differences, and develop educational products that appeal to different individuals.

Developing products that appeal to people with diverse backgrounds is challenging. Individuals viewing curriculum from a masculine perspective will value visibility and competition, while those who hold a feminine perspective may want to simply pass the course and maintain a collaborative relationship with their classmates (Hofstede, Hofstede, and MinKov, 2010, p. 160). German students with high uncertainty avoidance scores value structured curriculum, while British students with low uncertainty avoidance scores value the freedom offered by vague objectives and broad assignments (Hofstede, Hofstede, and MinKov, 2010, p. 204). Other vectors of cultural difference have similar disparities, and for educational technology to be accepted, and for students to be receptive to the knowledge it imparts, the curriculum must be tailored to the individual to address these differences.

Ghemwat (2017) stated that education technology has the potential to customize content and deliver curriculum tailored to individual learning styles; student experiences could differ and change as they progress through dynamic material that evolves with them (p. 58). Leveraging education technology in this method would allow it to address the various aspects of the digital divide. A student might begin a course with an extremely structured curriculum, but part of that

curriculum might involve lessons designed to decrease reliance on that structure. As the student progressed through the material, assessments would reveal an increased level of knowledge, and the linear design of the course would slowly give way to curriculum formatted in a way that maximizes freedom of thought. A student entering the course whose initial testing revealed they did not require such structure at the beginning of their education pipeline would never be subjected to the level of structure that the first student experienced.

A similar methodology can be adapted to address all cultural, socioeconomic, and generational aspects of the digital aptitude divide, and the effect will be a narrowing of digital divides between students. For this solution to succeed, additional research and development are required to create an adaptive platform that can alter content delivery methods automatically based on performance metrics which must still be defined. Additionally, this learning platform must contain instructional modules designed to keep teachers updated with its continuous upgrades so that they can maintain the ability to intervene when warranted for individual students. As this technology progressed, teachers and professors would take on a role similar to system administrators who monitor content updates and override automated curriculum adjustments as warranted. This platform would evolve, and its self-teaching modules would allow administrators and students to maintain proficiency in its use.

Conclusion

The digital aptitude divide exists due to generational, socioeconomic, and cultural issues, and this divide generates a problem of inequity in achieving the benefits promised by education technology. However, technology also provides a solution that if applied correctly has the potential to address the generational, socioeconomic, and cultural dissonance that yields the digital aptitude divide. Technology is infiltrating classrooms around the world, and all societies

have a stake in ensuring that it connects people rather than creating additional division. There is disagreement among researchers on the specific factors that create the digital divide, but there are few who would claim that the divide is not a problem that needs to be addressed.

Addressing the digital aptitude divide with technology will require research, funding, and patience. It will also require individuals to account for factors outside of the education environment and apply controls that mitigate them. Individuals from low socioeconomic backgrounds or older generations that have had limited exposure to technology will require specific curriculum to address their deficiencies and bring them closer to their more technologically adept peers. The current method of delivery, which offers all students the same format and content to achieve equality of opportunity, actually only offers those whose aptitudes are in line with the perceived norms of curriculum developers an advantage over those who are not in line with these perceived norms. In conclusion, education is one realm where material should be presented on an individual level in a method designed to achieve equality of results rather than equality of opportunity because only individualized curriculum designed with this end in mind will present genuine equality of opportunity for everyone.

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