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Alexa?: Possibilities of Voice Assistant Technology and Artificial Intelligence in the Classroom

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Alexa?: Possibilities of Voice Assistant Technology and Artificial Intelligence in the Classroom

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Introduction of Literature Review

Historically, technology has been sought to make life easier. Though basic technology can be traced back to early human life, in the form of simple tools, the technology referred to for the purpose of this article is defined as an electronic device used to meet human needs. This modern technology has become so mainstream, that people depend on it. Its demand has increased, and so has its functionality and accessibility. It is only natural that these expansions of modern technology have created an inclination towards the incorporation of technology in education.

In order to better prepare students for a constantly changing and technology-driven society, educators must increase their use of technology in the classroom. Today's students are accustomed to having a piece of technology in their hands outside the classroom, so educators need to teach students that technology is not just for entertainment; technology can also help them learn. By incorporating technology into everyday activities, students may be more engaged in the classroom, work more efficiently, and may also experience a more personalized learning experience. As technology is transformed into a learning tool, varying opinions and research about the use of technology and its effect on the digitized youth of today have surfaced (Franklin & Bolick, 2007).

Additionally, as new ideas and functions continue to surface in technology development, the need to find new and innovative ways to use technology in educational settings increases. The exploration of Artificial Intelligence in education is an intriguing area. Artificial Intelligence (AI) is characterized by its reliance on machine intelligence, which differs from Natural Intelligence (NI), characterized by its reliance on humans and other animals. Artificial

intelligence has the potential to provide opportunities across multiple grade levels in the educational setting.

This reflection and study of our classrooms looks to better understand both our use of technology and students' use of technology in very specific ways. Is there a place for voice assistant technology in our classrooms? What benefits are there? What obstacles exist? We tell our stories and experiences here with the intent to provide context and continue the discussion among more of our colleagues.

Literature Review

Technology in Education

Before we explore the opportunities that Artificial Intelligence can bring to the classroom, we must first explore the rationale behind including technology in the classroom. Technology in education has seen its trends through the years. The increased importance of technology in our education system has been swift. Where does this sweeping change come from? The continual invention of technological products and the internet that are both prevalent in our society could be attributed to this change. The acceptance of new and innovative technological devices has transformed the way we do everyday activities, such as reading, writing, listening, and communicating (Franklin & Bolick, 2017; Holum & Gahala, 2001; Leu, Kizner, Coiro, & Cammack, 2004). Embracing these new technologies and the internet has forced us to rethink the way people learn and are empowered to gather information (Saulnier, 2015). This cannot be embraced without consideration of the effects that technology can have on not only the education system, but also the students affected by this change.

Effect on Education

Because of its growing relevance in today's world, we are pushed to consider the effects technology can have on our educational programs. As we dig further into the effects of technology on education, it is crucial to highlight the fact that how we use the technology becomes essential in judging this impact (Holum & Gahala, 2001; Means & Olson, 1995; Saulnier, 2015).

The simple presence of technology may not have a significant impact; however, the intentional use of technology can leave a lasting impact on students and teachers alike. When technology is focused on the emphasis of learning standards, it can become a powerful tool for student learning and produce profound effects, as demonstrated in the Apple Classrooms of Tomorrow (ACOT) project (Franklin & Bolick, 2007; International Society for Technology in Education, 2000). Additionally, when using technology in the classroom, it is essential to reach out beyond mere reinforcement of concepts and word-processing; instead, we must dip into the potential that can await when technology is integrated directly into curriculum instruction (Holum & Gahala, 2001).

When implemented with fidelity, technology has the power to help transform traditional classrooms and instruction in a real, visible fashion that fits the instant gratification present in today's society (Salomon, 1998). This transformation from the traditional classroom can be easily recognized and produced in a relatively quick fashion when technology and training are readily available. This new environment can provide a means to place a greater emphasis on the 21st-century learning skills that seem more important now than ever before (Intercultural Development Research Association, 1995). Technology can create new learning environments that yield opportunities for students to experience learning in a whole new realm, full of exploration, customization, creation, and much more (Franklin & Bolick, 2007; Leu, Kinzer,

Coiro, & Cammack, 2004). Within this lies the emergence of teamwork and interdisciplinary teaching opportunities (Salomon, 1998).

Due to the interactivity of technology in lessons, part of the transition in the educational setting must be in the shift that yields passive learning to one that promotes active learning (Bransford & National Research Council, 2000). Interactive lessons that involve technology open the doors for learners to explore topics at their own pace and revisit them as necessary. It takes students further into an environment that allows them to try out their ideas and receive the necessary feedback for growth (Bransford & NRC, 2000; Na, Kang-Hoa, & Chun-Hoa, 2010). The consideration of the impact of technology on our educational programs cannot be fully explored without considering, separately, the impact that technology can have on our students, who are experiencing these transformed educational programs.

Effect on Students

Though effectiveness of technology on students learning has proven to be difficult to measure (Franklin & Bolick, 2007; McNabb, Hawkes, & Rouk, 1999), some studies have demonstrated increases in student learning and content area achievement (Costley, 2014), which has carried over into increased standardized test scores for students and schools. This has been demonstrated via multiple testing instruments including the SAT, NAEP, and Stanford 9 tests (Cradler, McNabb, Freeman, & Burchett, 2002) One study, specifically, reported an 11% total gain in their testing scores (McNabb, Hawkes, & Rouk, 1999).

Time and time again, technology has proven to a motivator for students. Motivation is a key to student success in the digital world we live in. Students are drawn to media, and it can be used to motivate and connect them to their learning (Chen, 2010; Costley, 2014; Granito & Chernobilsky, 2012; Jukes, 2006; Na, Kang-Hoa, & Chung-Hoa, 2010). This motivation can be

seen through the enhanced authenticity and real-life feel of tasks that students are exposed to while using technology (Bransford & NRC, 2000; Granito & Chernobilsky, 2012; Means & Olson, 1995). In these real-life tasks, students are encouraged to solve problems that they may encounter outside the walls of the classroom, but within the protection of the educational environment. The use of technology can provide a way to bridge the gap between the facts learned in the traditional model and the application learned in the real-world simulations. This can promote lifelong learning for students as those task-related skills are applied in other areas (Costley, 2014).

Additionally, with the absence of technology, students are limited to the resources available within the school walls. However, through the use of technology, education is more easily customized to student interest due to the fact that technology can bring new resources to student fingertips that would not otherwise be available. It provides the opportunity for students to connect with real people, places, data, and sources (Bransford & NRC, 2000; Franklin & Bolick, 2017; Means & Olson, 1995). Information that would not be available in the traditional textbook can be made easily available through the use of technology. Experts in varying fields can be brought into the classroom without the confines of time and location. The limits of geography can be erased when technology is implemented.

Qualitative research available on technology use is available from both a teacher and a student perspective. Teachers agreed that there were notable improvements in student skills and products, motivation and self-esteem, and collaboration and responsibility (Means & Olson, 1995). Students provided positive feedback about enjoyment in learning, which led to motivation. According to those students, technology provided an interesting and interactive means of learning through discovery. Ultimately, we want our students to be excited about what

they are learning and make connections. Technology can provide an element of student engagement that may not be able to be created in its absence (Costley, 2014; Sawang, O'Connor, & Ali, 2017).

Limitations to Implementation

The successes of implementing technology cannot be presented without a discussion of the limitations of implementing technology. As with any curriculum or trend, it must be implemented with fidelity in order to see success. This successful implementation requires buy-in from teachers and students alike. Unfortunately, not all students and teachers will feel comfortable with the integration of technology. Some students and teachers may feel hesitant to implement the technology due to perceived ability, personality, and social influence (Franklin & Bolick, 2007; Sawang, O'Connor, & Ali, 2017; Taylor & Todd, 1995). Students need to feel comfortable enough with technology to feel that they can perform well (Granito & Chernobilsky, 2012). Teacher exposure needs to be frequent, as well, if it is to be implemented with fidelity (IDRA, 1995). When teachers are well prepared to utilize technology in their teaching to meet curriculum goals, a successful learning environment is created that can be powerful for students. Without proper preparation, teachers may fail to use the technology to integrate into the curriculum, but rather, they will resort to utilizing it solely for preparation and communication, which does not place technology into students' hands (Franklin & Bolick, 2007). Unfortunately, limiting such technology use in schools to clerical teacher tasks is also limiting the potential to maximize student learning outcomes.

One idea that is often brought up when technology is discussed as a part of education is the effect of over-indulgence in technology. Some of the concerns that were seen consistently across this type of research were social alienation and loss of teacher authority (Holum &

Gahala, 2001; Salomon, 1998). The decrease in face-to-face interaction that comes from interaction with technology makes social alienation a valid concern. The lag in human interaction can create a deficiency in the ability to interact appropriately in exchanges with other individuals (Kamenetz, 2016). Similarly, teacher authority slips away as students look more to technology and less to their teacher to seek knowledge and answers.

Additionally, in regards to over-indulgence in technology, concerns are raised about potential changes that can take place in the brain. Some research claims that too much technology exposure can cause a decrease in its ability to maintain focus, attention, mood, and thought (Salomon, 1998; Rubin, 2012; Small & Vorgan, 2008). Is the brain elastic enough to overcome these issues? Other research supports the idea that the brain has the ability to recover quickly from these negative effects (Mednick & Ehrman, 2002; Rubin, 2012).

Due to the fact that technology is evolving rapidly, gaps are left in the research. Though research is available for several varying types of technology in the classroom, there is still very little research available regarding specific pieces of technology. Artificial Intelligence (AI) is one of those areas that needs additional research. With AI being the wave of the future, it will be important to begin defining it as a tool for use in education and to begin building a database of research that considers its effects on our education system and student learning.

Artificial Intelligence

In order to carve out a place for Artificial Intelligence in education, we must first understand what it is. Artificial Intelligence (AI) is the science and engineering of making intelligent machines, especially intelligent computer programs (McCarthy, 2007). The goal of AI is to allow computer programs to solve problems as well as humans. According to DeSiano &

DeSiano (1995), humans identify problems and AI enables the problems to be solved. Humans develop an extensive accepted set of rules for AI to use when problem solving.

According to Tegmark (n.d.), there are two types of AI: weak AI and strong AI. Tegmark (n.d.) describes weak AI as a narrow task, such as facial recognition, and strong AI as a cognitive task that may outperform humans, such playing chess.

According to ADI (2017), machine learning stems from AI and uses algorithms to increase the efficiency and accuracy of understanding and analyzing large datasets. Machine learning incorporates training to develop a model that represents the relationship between data input and output. That model is used in the process of analyzing the data to understand and classify information about the features in a data set. Machine learning can use the information from previous data examples to understand new data in the future.

B. Gaspar explained two divisions of machine learning: shallow and deep networks. Machine learning plays the role of analyzing and developing a model to understand complex data in both shallow and deep networks. Shallow networks do simple data discrimination and analysis, such as predicting housing prices. Deep networks understand much more complex features, such as identifying if the subject of a picture is a dog or a cat, or interpreting gestures from a video as sign language (personal communication, October 19, 2017).

The Development of Artificial Intelligence

As we begin our research in the area of artificial intelligence, it is important to highlight some key achievements that have proven essential in further development of Artificial Intelligence (AI). According to Spice (2006), the starting point of modern technology began over the Christmas holiday in 1955. Dr. Herbert A. Simon and Dr. Allen Newell spent the holiday break creating a version of thinking machine they coined as Artificial Intelligence (AI). This

thinking machine was program called Logic Theorist and was meant to run on a computer. At the time, computers were basically used to crunch numbers and produce a vast amount of information. Language translation by machine, speech recognition, and robotics can be tied back to Simon and Newell's beginning AI work.

Dr. Newell was a mathematician working for Rand, which was an air defense station. Dr. Newell's initial thought came while working with two-dimensional maps and witnessing the way the program could manipulate symbols and points on a map. J.C. "Cliff" Shaw quickly joined alongside Newell in the process of developing the program at Rand. His contribution was used more for the technology needed for map and radar development. Dr. Simon accidentally stumbled into working with Newel and was hired as a consultant to aid in the development of the program.

In 1964, computers gained the capability to understand human language. Doug Engelbart, in conjunction with the Stanford Research Institute (SRI), invented the mouse. The Stanford Research Institute created Shakey, a robot that combined locomotion, perception, and problem solving. To date, Shakey was the first product that used an in depth problem solving program. In the early 70's, natural language processing was studied further at SRI. In the mid 70's, Alan Kay and Adele Goldberg developed Smalltalk language. Smalltalk language established the power of object-oriented programming and icon-oriented interfaces. In 1980, Stanford University held the first national conference of the American Association of Artificial Intelligence. In that same year, a framework for the HEARSAY-II speech understanding system was first published. Major advancements in all areas of AI significantly developed in the 1990's.

Google later added to the development of AI when they created a strong AI computer system that beat the world's best human at an ancient strategy game called Go (Jin-man, 2016).

Go originated in Asia about 2,500 years ago and it is considered many times more complex than chess (Jin-man, 2016). Google's programmers built a neural network that learned how to play Go by itself, imitating a model brain.

Brumfiel (2016) explains:

The Google program, known as "Alpha Go," actually learned the game without much human help. It started by studying a database of about 100,000 human matches, and then continued by playing against itself millions of times. As it went, it reprogrammed itself and improved. This type of self-learning program is known as a neural network, and it's based on theories of how the human brain works. AlphaGo consists of two neural networks: The first tries to figure out the best move to play each turn, and the second evaluates who is winning the match overall.

Artificial Intelligence in Education

Throughout the 20th century, advancements in technology have quickly progressed. Technology in education has also rapidly evolved. Demonstrations in machine learning, intelligent tutoring, case-based reasoning, multi-agent planning, scheduling, uncertain reasoning, data mining, natural language understanding and translation, vision, virtual reality, games, and other topics were some of the essential components to the development of modern technology in education.

There are many ways AI is and can be used in education. Gann and Dodgson (2017) suggest that AI may be used to ensure students have not plagiarized or misused statistics, and machine learning is capable of flagging inappropriate content in research projects. Simulations and games with AI capabilities provide people with opportunities to collaborate on worldwide projects and to complete online courses.

One of the most beneficial ways AI can be used in education is through the use of adaptive and progressive curriculum. In the general classroom, most teachers teach a few skills simultaneously and each student is expected to understand those skills at the pace the teacher sets. Research by Walsh, Hoque, and Williams (2017) promotes the idea of differentiation through an adaptive learning environment. Currently, most online learning systems adapt to increase the efficiency in students' learning, but are weak at motivating students (Walsh, Hoque, & Williams, 2017). With the help of machine learning, there could be a variety of motivational features to understand how to increase each student's motivation. Walsh, Hoque, & Williams (2017) explain the importance of researching human machine learning symbiosis so online learning modules can adapt to students' learning progression. This will ultimately increase students' learning and motivation.

Interaction with Artificial Intelligence in the classroom can look different in a variety of settings. Though each setting may use Artificial Intelligence in a slightly different way, it is important, across all settings to be aware of how to effectively interact with an Artificial Intelligence device. These interactions can produce varying results in regards to successful implementation of Artificial Intelligence in the classroom.

Questioning

Chin and Osborne's (2010) research discusses argumentation and its importance. Their research states that "it affords avenues for the articulation of alternative viewpoints, cognitive dissonance, reflection, and reasoning, all of which can foster learning and the co-construction of knowledge" (p. 884). Argumentation allows student to not only build their "arguing" skills but their ability to argue to learn. By posing questions, students can challenge opposing viewpoints and sustain dialogue while gaining a greater understanding of other viewpoints, and, in turn, their

own by reflecting on the responses of others and how those responses relate to the speaker's own beliefs.

Furthermore, when students work with their peers to work towards a solution in order to understand a problem or task, the questions ask do not only interest the individual student but other group members as well (Chin & Osborne, 2008). By engaging other group members, worthwhile discussions can ensue, which leads to the sharing of different viewpoints that can lead to a greater understanding of the subject matter as students are able to gain a greater understanding of the material being discussed. Additionally, these discussions can make students more curious about the subject matter, which leads to more questions and deeper research.

Questions that students ask may “be triggered by inconsistencies between their prior knowledge and the new information which they are receiving” (Chin & Osborne, 2010, p. 885). By asking questions, students can fill gaps in their own knowledge. Questioning allows students to become more aware of what they do and do not understand and to link new information to their prior knowledge. In Chin and Osborne's (2008) research, they shared that questions show that students are thinking about what they are learning as students are trying to make connections between new information and things they already know. In order to fill the spaces in their knowledge, students must ask questions in order “to articulate their current understanding of a topic, to make connections with other ideas, and also to become aware of what they do or do not know” (p. 2).

Students with strong questioning skills are able to “engage with their current understanding, probe into alternative ways of explaining phenomena, and ask why certain explanations are better than others” (Chin & Osborne, 2010, p. 886) Questioning allows students to better understand their own learning and the world around them.

Smart Devices

Wang's (2013) research reflects on students using mobile smart devices to ask questions when teachers and/or peers are not available for assistance. A few reasons why incorporating technology into the classroom as a means for answering questions are that some students may not feel comfortable asking questions due to the nature of topics, classroom climate, teacher and peer reactions, and/or nature of topics (Chin & Osborne, 2008). Some students may not be comfortable "taking risks" by asking questions in front of the class, so using technology may serve as a safer alternative as they do not focus on the reactions from others in the classroom.

Students are able to use their devices to receive immediate feedback rather than searching the internet or using other apps. This immediate feedback from their smart devices can immediately assist students in their learning. Currently, an ongoing research project has created an "Instant Questioning-Answering (iQA) system." The iQA system is tailored to work like a chat room with an answering robot that serves as a tutor for each chat room.

When relating this research to the use of the Amazon Echo Dot, one may think of the questions students may create. When asking Alexa questions, students have to be very specific with their questions and must carefully word their questions so Alexa easily understands what is being asked of her. This is similar to having a smart device answer questions as both are connected to the internet and reference different databases on websites online.

The Question Understanding and Analyzing (QUA) module analyzes questions asked by students and provides analysis to the Answering Feedback (AF) module. This analysis helps determine common questions that are asked by students. The Question Answer (QA) database will then match questions asked by students with those already in the database and will provide timely feedback to the learner. An additional purpose of this database is to "continuously collect

the questions learners raise over a long time, the iQA system can help teachers understand learners' learning needs" (p. 147). In order to efficiently use this database, students should be trained in how to most efficiently ask questions that lead to the desired responses. If questions are not worded thoughtfully, students may not receive the type of feedback needed in order for them to gain a better understanding of the content they are discussing.

Reading Comprehension

Taboada and Guthrie's (2006) research focuses on the relationship between student-generated questions and prior knowledge with reading comprehension. Their study defined questioning as "self-generated requests for information within a topic or domain" (p. 1). Through Taboada and Guthrie's research, they have concluded that active comprehension is made possible by student questioning in that students who ask and answer their own questions play a more active role in their own learning. This research explores the level of questions that students ask and answer; in order to have an effect on reading comprehension and student learning, Taboada and Guthrie determined that "students need to learn to ask questions that go beyond the literal level of term definitions and require integration of information between the text and the reader's prior knowledge" (p. 3).

Furthermore, this research recognizes that those students who ask questions improve their comprehension, but the question still remains as to why instruction in questioning improves reading comprehension (Taboada & Guthrie, 2006). Their research acknowledges three possible influences: active text processing, knowledge use, and attentional focus. Taboada and Guthrie recognize that the organization of information in the student's mind, along with the student's prior knowledge, helps the student generate questions to deepen his/her personal learning.

Taboada and Guthrie's (2006) study included 360 third and fourth grade students who received packets that included text difficulty that was equally spread through the packet. This study explored the topics of prior knowledge by measuring the students' prior knowledge regarding an ecology topic, questioning by allowing students to write questions before or during their reading in order to help them understand the topic, and multiple text comprehension which includes "students' competence in identifying text-relevant information, reading to obtain question-relevant information, taking notes, and writing an open-ended statement expressing conceptual knowledge gained from performing this task" (p. 16).

The results of this research showed that students' questions related positively to their reading comprehension; this is supported by previous research that proves students who have a higher prior knowledge in a given topic area are able to ask higher-level questions. This connection leads to greater understanding of the content and greater reading comprehension. Through this research, Taboada and Guthrie determined that there is no connection between prior knowledge and questioning for the students. Both of these areas, however, have benefits for student comprehension, but those benefits are independent of each other.

Technology in Education: How AI Can Create Critical Thinkers

Classroom skill shift. Artificial intelligence is replacing so many aspects of society - automated driving systems, artificial organ replacements, assembly line precision, prediction of business models, etc. So how do educators prepare students to live in a world where the job they choose may one day be replaced by artificial intelligence? Education needs to shift in a direction that teaches students less material knowledge and more critical thinking, problem solving, and human interaction skills. Many companies have machines that can do the mundane work, so they look less for prospective employees to have traditional school-based knowledge and more for

skills necessary for human interaction. From a businessman's viewpoint, "empathy - the ability to understand and share the feelings of another - is one of the top traits my company looks for in prospective employees" (Satterwhite, 2017, p. 1). Therefore, if schools are allowed the time to focus more on these soft skills rather than on rote memorization of knowledge that can be discovered from a quick Google search, they will produce better employees and contributors to society.

Much of education looks the same today as it did in the past, minus perhaps a SmartBoard instead of a chalkboard and a computer or iPad instead of notebooks. But has this technology just replaced the mode in which content is delivered and studied, or did it actually transform learning? Vivienne Ming (2017) suggests that artificial intelligence can be a valuable tool for teachers to understand where students are struggling, not just with content but with their overall purpose and sense of self as a learner (Nguyen-Okwu, 2017). Today, students can Google the three types of volcanoes . But can they Google what the impact of a particular volcano means for a local village, how to prepare that village for an eruption, and what the worldwide economic impacts might be if such an eruption occurred? And really, where should students focus their time? Should students focus their time on the rote memorization or analytical approach? With new advances in AI, scientists suggest students need to understand how to analyze information, not just memorize it because technology is replacing jobs with a repetitive nature. This new technology suggests that students should start preparing for a world needing people with higher order thinking, creativity, and communication skills (Stark, 2016).

Many have tried to create purely online programs for students, trying to do away with a teacher almost entirely except for intervention purposes. But research does not support this model and suggests this idea creates bigger gaps in learning, not smaller ones. Technology has

been programmed to help the average student - but how is average determined? Education is filled with students who do not fit a mold. But a mold is what today's educational technology is programmed to help with. Ming suggests that programmers focus their coding abilities on helping AI understand human differences in addition to the similarities it already knows (Nguyen-Okwu, 2017).

Implications of AI (creating job security and societal advancements). Johnson questions whether technology will make people more or less human based on how much they interact with artificial intelligence, among other forms of technology. He argues that it all depends on how technology is designed and incorporated. If technology is designed to help people explore their curiosity and discover their altruism, people may become more human. If technology replaces human relationships too much, those using technology may lose much of what it means to be human (2017). So how can people design technology to help educators explore the higher intelligences and abilities humans possess (that no other species possess) rather than squash these abilities entirely due to our dependence on an artificial being?

“When machines become more intelligent, humans are freed to become more creative. That opens doors to completely new possibilities” (Stark, 2016, p. 1). Society has come a long ways since pre-Industrial Revolution society. It used to take hours to get dressed in the morning, many could not work after dark, travel was a luxury many could not afford, and communication was impossibly slow and unreliable. Now apps tell people how to dress, electricity allows society to be up at all hours, airplanes allow people to travel across the globe in a matter of hours, cars can drive themselves, and a web of communication abilities straight out of a science fiction novel now exist. Technology has led society to greater heights than people may have realized they could achieve. In order for this trend to continue, students need to be educated on the

productivity of technology, creative ability, and how to use this technology to their advantage, not allowing it to suck away their free time. Students should learn how to use technology to eradicate time killers to free up their time for other endeavors that move society ahead once more. Machines can process data now; humans are no longer needed for this work. Instead, education needs to begin teaching students how to properly deal with this time and use it to their advantage, not wasting this opportunity (Stark, 2016).

How AI Impacts Language Acquisition

Machine processing has been useful in varying fields of study. One such example of this is the study of languages. Language acquisition for second language learning is one area where students are achieving at new and interesting skills. Language technology is indeed taking them to greater heights. The most recent technology rewards the learner with a point system. Gaming is an attraction for students and somehow correcting their errors becomes less the focal point than is the overall goal, which is to advance to the next level.

Theoretical approaches to error correcting while learning a second language have been controversial (Dodigovic, 2007). Some state that learners can acquire a second language without pointing out their errors and that drawing attention to the errors is actually not helpful to the learner (Krashen, 1987). Others believe that addressing the errors is conducive to second language learning and helps the learner to notice systemic features of language and can indeed be helpful (Ellis, 1997). What most SLA (Second Language Acquisition) theorists agree on, is that noticing is crucial in language learning (Schmidt, 2001). Noticing supports consciousness-raising, which leads to what both Krashen and Ellis call conscious learning responsible for accuracy (Ellis, 1997; Krashen, 1987). Overall, most theorists agree that correction is helpful (Dodigovic, 2007). Benefits of error correction lead to remediation or the disappearance of errors

(James, 1998). One of the instruments used in second language error correction is artificial intelligence.

Artificial Intelligence can be used in language learning in order to emulate the behavior of a teacher or a learner (Matthews, 1993). To emulate the language teacher, the machine needs to have the knowledge of teaching methodology. Furthermore, in order to emulate the learner, it needs to have the knowledge of learning styles and strategies (Bull, 1997). The teacher's language is expected to be correct while the student's language exhibits errors (James, 1998). These two together have been referred to as interlanguage (Cook, 1993). In order to correct language, a good parser is going to need to have both qualities. On one hand, it is going to need to be intolerant of errors, but in order to process student's input; it must also be tolerant of error (Dodigovic, 2007). So it seems there is a need to balance both aspects in order to have effective learner outcomes.

Some theorists may argue that artificial intelligence is focusing on errors, but its overall use can be effective when considering the learner is being corrected on target structures that the he/she needs in order to remedy the errors to accomplish the language tasks. Comprehensive needs analysis is done first to determine the frequent errors in learning a second language (Dodigovic, 2007).

One particular instrument researched was the use of the Intelligent Tutor, a computer program designed to diagnose and correct some typical errors produced by adult learners of English as a second language (Dodigovic, 2007). Dodigovic's research states that the important pedagogical question is to know when to correct an error. Also important is to know if the error is (intra)lingual or related to the first language (L1) transfer (interlingual) (James, 1998). The

Intelligent Tutor was designed with interlingual constructs in mind, but in order to accomplish their task, they realized it needed the intralingual approach for the learner as well.

The Intelligent Tutor can modestly accommodate individual learners. The Intelligent Tutor makes an attempt to accommodate varying learning styles. The appealing quality of the Intelligent Tutor is that it assumes the learner has been taught, but not exposed to adequate target structures (Dodigovic, 2007). “More people learn English through technology than by any other means. Out of 1.5 billion English language learners across the globe, only a fraction have the resources or access to learn the language through formal teaching” (Clark, para. 1).

The new wave online for teaching English is AI (Artificial Intelligence). Learners can interface with language through voice. Two options online are Amazon Alexa and Google Home. Consumers can switch their Amazon Alexa to German; Alexa understands what they are saying and will also respond in German. As a result, dialogue-driven interfacing is happening in the home. Expect more of these speech-driven devices in language learning (Clark, 2017).

The personalization of AI in language learning recognizes who the speaker is and can track his/her progress. Duolingo is one of these personalized learning devices. Duolingo has also experimented with Chatbots in order to bring the scalable, personalized dialogue and immersion that language learning requires. Chatbots allow speakers to talk online via text or speech. Scaling the quality of the learner is what AI loves. Using it more, improves a speaker’s quality (Clark, 2017). “AI is many things and can be used in many ways for improving learning interfaces: creation of learning content, curation of content, control of feedback (adaptive learning), dialogue, immersion, student engagement and assessment” (Clark, 2017).

The teaching and learning of languages will be revolutionized the same way as was the translation of languages by AI (Clark, 2017). AI Technology provides the media for language

learning without the teacher. Since acquiring the language is what most SLA theorists agree on to be best for language learners, then AI certainly has a future in language learning. It may even take the “learn” out of the equation. In fact, this article may need to be renamed to “Artificial Intelligence and Second Language Acquisition”.

Introduction of Research

The following narratives represent the following research conducted by educators, elementary through high school.

Kindergarten (Meyer)

Approach

I began utilizing the Echo Dot in my classroom to ask questions related to curriculum, play music, and identify the weather conditions during calendar time. My intentions were to have the children learn through watching me use the device at first. Eventually, I wanted the children to access the Echo Dot for their own purposes such as asking questions, spelling words, and entertainment.

Narrative

I introduced the Echo Dot to the children during group time. As a group we set guidelines for its usage during our day. We brainstormed ideas for using the device to help us in our learning. Ideas for use included listening to our favorite songs, asking questions to things we did not know, turning lights off and on, playing games, making lists, spelling words, and checking the weather. The children observed my usage of the Echo Dot during the day. I made a purposeful effort to use the Echo Dot in areas we brainstormed. I modeled using simple requests

and using proper diction while speaking. I also demonstrated what would happen if the device was addressed incorrectly. The children began to utilize Alexa slowly over the course of the semester. The children followed my example and used the device mostly while acting as calendar leader. During our calendar routine, children were cued to ask for the current temperature. Another time during the day children were able to freely access the Echo Dot during their free choice. During this time the children would utilize the device to play music, take brain breaks, and answer questions.

Analysis

I learned early on the children were more familiar with the device than I. Some of the children had the device at home and were quite knowledgeable on its usage. The children that had familiarity with Alexa had no trouble using the device. The children that were not familiar with Alexa were hesitant to talk to it in front of the class at first. Asking questions was frustrating initially for the children because they had to think of a way to phrase the question to obtain the answer they were looking for. Some children were frustrated when the device did not answer them the way they anticipated. During a period of time the Echo Dot would include flash flood warnings before the temperature for our area. Some students found the extra information overwhelming and had difficulty waiting for the information they were seeking. There were times the device would respond unexpectedly when conversation sounded like the device was being addressed. The children were able to discontinue use by using the command, “Alexa, stop”.

Kindergarten (Christianson)

Approach

In my Kindergarten classroom, we used Alexa as an additional educational tool. My students had the choice to utilize Alexa throughout their various learning time. Mostly, my students used Alexa for spelling, listening to music, questioning, and obtaining new knowledge. During free-choice or inside recesses, my students used Alexa to play music and participate in various brain break or movement activities. Daily, my calendar helper used Alexa to inform our class about the weather forecast and upcoming weather patterns. These times are student-lead. As an educator, I used Alexa as a management tool. I used the timer and list features daily to aid in my educational planning and implementation of my small groups.

Narrative

At my Back to School Night, I introduced Alexa to my parents. I informed them I would be using Alexa in my classroom as a part of my graduate school research project. Parents signed a consent form if they did not want their child to participate. Parents not in attendance were given a copy of the consent form, along with a description of the purpose of Alexa's use in my classroom. My parents were excited about this opportunity for their children and did not have a lot of questions. I had 100% of my families choose to participate in this research study.

At the beginning of the year, I took time to set up our routine for Alexa's use. Starting with the weather forecast and playing background music, I modeled how to correctly ask Alexa a question. I modeled correct and incorrect questions. We collaborated together to determine correct ways to ask a question. At my level, it is very important to provide both. Some students do not have prior experiences to draw upon, so modeling is essential. Students problem solved and collaborated together as they learned to successful use Alexa. We took time to learn how to correctly ask Alexa a question. A main focus has been waiting and listening to our peers. Also, we heavily focused on when can my voice be on and when do I need to have listening ears.

Alexa's start in the classroom was teacher-directed. I prompted her use more than students taking the initiative on their own.

As the year progressed, the use of Alexa became more student-directed. With growing comfort levels, my students would interact with Alexa on their own. During free-choice or inside recess, my students would use Alexa independently. However, during various learning times, my students would ask if they could use Alexa. My answer was yes, except in the area of spelling. Kindergarten teachers lay the foundation for reading readiness, so I did not want students to default to using Alexa while spelling. My students needed to try first on their own and then could compare their writing. As in any class, I have varied levels of learning and needs. But, all of my students would interact with Alexa. During free-choice, students would work together while asking Alexa questions. When Alexa could not understand a question, my students would collaborate together to determine what they needed to change in the question so Alexa could provide an answer. A student with Autism interacted with her the most.

At the end of the year, the use of Alexa tapered off. My students interest in her left. I needed to prompt her use more and the amount of student-driven use diminished. Alexa's use as a student educational tool or free-choice option has stopped.

Analysis

At the conclusion of our Alexa use, my student's completed an interview. I asked my students their thoughts regarding Alexa. I asked each student what they liked, what they did not like and what they used Alexa for the most throughout the year. Throughout the interview process, I did ask students to elaborate on their thoughts and ideas. I asked students to tell me more and give me more thoughts about their experience using Alexa. The results were fairly similar. My students liked using Alexa, especially in the area of spelling and listening to music.

My students would ask Alexa to spell our Kindergarten High Frequency words or Sight Words, such as, I, like, the, and, see, we, to, come, with, what, ect. Students would reference our classroom word wall while Alexa was spelling the word. The most common word spelt besides our sight words was love. Students discussed how they liked to use GoNoodle for movement or brain breaks rather than Alexa. GoNoodle provides students with a visual model of the movement or brain breaks. When discussing what students did not like about Alexa, the negative responses were when Alexa did not answer the question they asked. Students needed to take time to reformulate their questions and simply ask again. Alexa was used most for spelling and listening to music. I feel the decrease of Alexa's use came with my students developing more confidence in their writing. Writing is a difficult task in the first semester of school. Confidence is low and abilities are growing. With more practice and exposure, writing becomes easier. As students mature, so does their development of skills. So, students are more willing to take risks in their writing on their own and do not need additional assistance.

Third Grade (Gaspar)

Approach

My third grade classroom and I use the Echo Dot as needed each day. We were able to use the Echo Dot in several ways: for time management purposes, weather forecast, spelling words correctly, gathering information and answer questions, listening story center during reading, and games for brain bursts and indoor recesses. We also used the Echo Dot, almost daily, to play music through Amazon prime.

While implementing the Echo Dot and discussing the classroom expectations, we had a discussion about the Echo Dot being a device, not a person. We decided to refer to the Echo Dot as "it", rather than her (because it's name is Alexa).

Narrative

I introduced my class to the Echo Dot the first day of school by modeling some different uses for the technology. I started with asking for the weather forecast, followed by a few other skills: setting a timer, listening to an inspirational positive quote from Happy Days, and playing SimonSays Game.

I was most excited to use the Echo Dot to eliminate the frequent question each day of what students need to wear for outdoor recess, according to the school's temperature guidelines. I was pleasantly surprised by how intrigued the students were about asking a device about the weather, rather than waiting for the teacher to look it up on the computer or personal cell phone.

As the year went on, most of my students became more comfortable with using the Echo Dot on their own. Some students needed more encouragement to use it than others, but found satisfaction once they had used it. In order to increase the usage in all students, we decided to schedule the Echo Dot into reading centers.

Students found the stories from Amazon Storytime engaging but disliked having to create and imagine illustrations for the stories. I found this helped students practice listening skills, and allowed me to identify who would benefit from more listening practice.

As the winter came and we were forced to have indoor recess, I found students wanting to use the Echo Dot to play games. A few of the students that used the Echo Dot more frequently assisted in searching for skills to enable. Some of the skills we found to be most engaging were: Song Quiz, Jurassic Bark, Daily Kindness, Memory Game For Kids, and Animal Game. While enabling some of the skills, I found a credit/debit card was required to provide proof an adult was enabling the skills. I was initially hesitant and told students we would be unable to enable skills

requiring a card. After about one week of searching and coming up empty for child-friendly skills not requiring a card, I gave in. I am happy to say I have not been charged with any fees or purchases since linking my card number with my account.

I introduced my students' parents to the Echo Dot during our Back to School Night, where I also explained the research project and the opt out form. I had one parent return the form, opting out of the research. Parents did not seem to have many questions about the device, but there were a few parents who said they enjoyed having an Echo at home.

Analysis

I found the Echo Dot was best used as a tool in our classroom for the students and teacher. Through analyzing my Amazon Alexa account, I found the Echo Dot was used an average of 13.7 times each day in my classroom. As a teacher, this technology helped with time management and organization. Rather than coming to ask me questions or have me take time away from other students' learning, students would ask the Echo Dot questions or for help.

Students were asked to complete a survey with several questions about their experience using the Echo Dot at school. Some of the reasons students liked the Echo Dot were: helps with spelling, calms students down, tells jokes, plays games, tells stories, answers questions, and plays music. Some of the reasons students did not like the Echo Dot were: too many kids try talking to it at the same time, may be used inappropriately, has a hard time hearing students, using it is like cheating, and some felt students were not learning from it.

Student surveys showed that not all students though the Echo Dot was beneficial to their learning at school. Some of the additional information students wanted me to know about their experience using the Echo Dot were: it is a great robot, it helps you with a lot of stuff; it does not

help students learn; students like it but it is not their favorite thing, five out of ten rating; student wishes they had an Echo Dot; and it helps students learn.

At the beginning of the year when I would call on a student who's name sounded similar to Alexa, the Echo Dot would respond because it thought I said Alexa. As the year went on, the Echo Dot was able to distinguish whether I said the student's name or Alexa. Also, the Echo Dot was also able to recognize and understand what students said as the year went on, regardless of speech impediments. In the "what would you like me to know about your experience with the Echo" section of the student survey, one student wrote about it noticing her voice because she used it a lot. This provides proof that the Echo uses machine learning when listening and comprehending different people.

Fourth Grade Reading (Anderson and Nelson)

Approach

In this segment of the case study, we paired up as team of two teachers for researching because of a commonality of content and grade level. Both of us teach fourth-grade reading and thought that working together may help us to better identify the advantages and disadvantages associated with the use of the Amazon Echo Dot within our classrooms. We really wanted to determine if students were able to successfully use the device to answer questions and find out what contributed to the successes and failures during the process. Similarly, we wanted find out student feelings toward the use of the device and determine if students would continue to choose to use the device, even when other devices were available, after deliberate training opportunities were provided. Our classrooms were comprised of a total of 176 students divided between eight separate classes.

Narrative

We decided to embed the use of the Echo Dot within a two-week long Reading unit, and then we continued to collect usage data for an additional four weeks. The two-week long unit, featuring informational readings about Lou Gehrig and the disease that affected his life, included reading stations which allowed us to slowly introduce and integrate the use of the Echo Dot into the classroom work environment, while still maintaining close teacher observation. We chose this unit because it fell naturally at this time during in our curriculum map. Though we could have changed the unit, we felt that the topic would yield itself to the identification of specific informational questions for students to ask the device. We chose a route with scaffolding for students because we felt that in order for this to be successful, the students at the fourth-grade level needed to have some initial guidance before independently experimenting. We felt that this would allow students to build their confidence prior to using it independently. Within this unit we built in three different stations to systematically introduce and interact with the Echo Dot's virtual assistant, Alexa. After completion of the two-week long unit, students were given the opportunity to interact with the Echo Dot as they saw fit.

During the first station, the students were provided with a set of premade questions that would help guide them through actively asking and listening to Alexa's responses. They worked together in groups to complete the questionnaire. Some groups became frustrated with this experience. Once students were finished asking the premade questions, they responded to additional open-ended questions that engaged them in thinking about what they liked and did not like when interacting with the Echo Dot. There were a variety of positive responses; half (51%) of which demonstrated enjoyment in the fact that Alexa could give them answers and information. Some negative responses elicited reactions having to do with communication, such

as: [Alexa being] unable to hear or understand [the students] (28%) and [Alexa] talking too fast, including needing to have her repeat (10%). Other negative responses resulted from frustration (18%), a majority indicating Alexa's inability to respond appropriately (49%).

During the second station a few days later, the students developed their own questions to ask the device, which related to the Reading unit's topic. Students were given directions that encouraged them to reword their question if Alexa did not know the answer. They were also provided with a form that required them to use tally-marks to track the number of times they had to reword the question. The tally-marks served the purpose of demonstrating to the students that both devices may require multiple attempts, so the tally-marks were not tracked for our research purposes. Additionally, the students were asked to note whether or not they were able to find the correct answer. On the form, students reported that 26% of the time they were able to find the correct answer using the Echo Dot. Following the first station with the Echo Dot, students were instructed to use an iPad to search out the same question. Students tracked the same information in the same way on the number of times they had to reword the question and whether the correct answer was found. Students reported that 59% of the time they were able to find the correct answer using the iPad. Once students were finished with both ways of questioning, the students responded to additional survey questions that engaged them in thinking about their levels of enjoyment and ease while using the Echo Dot and the iPad. They also responded to a question that asked which device they would choose if they had the option. As demonstrated in Table 1, more students (58%) would rather use the iPad as a first choice than the Echo Dot. There was a spot included where students could leave additional feedback if they desired on one or both devices. The feedback indicated an overwhelmingly greater appeal towards the iPad, with 79%

of comments submitted being positive towards the iPad and only 43% of comments submitted being positive towards the Echo Dot.

Table 1

Response Questions	Rating of 1	Rating of 2	Rating of 3	Rating of 4	Rating of 5
I enjoyed working with Alexa to answer questions	3	17	24	16	12
Alexa is easy to use when I don't know something.	9	13	27	15	7
The ipad is easy to use when I don't know something.	5	5	26	18	16
Which one would you choose to help you answer first?	Alexa: 30	iPad: 42			

During the final station, the students were given the ok to freely use the Echo Dot as a tool within the classroom, in addition to the other tools that were already available, including: iPads, computers, and books. We tracked the choices the students made while completing classwork, such as: teacher-directed workshops, research projects, journal writing assignments, and other independent daily work. Though the initial two options did not include the computer, Table 2 demonstrates that students tended to seek out the computer the most (59%) of the time. Student use of the iPad (22% of the time) or the Echo Dot (17% of the time) were fairly equal.

Additionally, a very small amount of students chose to use a book as their primary resource (2% of the time).

Table 2

Devices:	Ipad	PC	Book s	Alex a
Total Number of Groups That Chose Each Devices as Their First Choice:	9	24	1	7

Analysis

As the Echo Dot was interacted with and data and observations were tracked, we were able to identify some obvious strengths and weaknesses. We found that although the Echo Dot can be a useful tool, there are recommendations to consider in order to utilize the tool successfully. Furthermore, there are weaknesses that were more difficult to overcome than others that could potentially prevent students from having positive interactions with Alexa. Finally, there are some conveniences that come with having an Echo Dot in the classroom that cannot be ignored.

One of the challenges we encountered was finding the right number of students that could work together with the Echo Dot, especially when we wanted all students to be able to utilize the device for a specific task. Initially the students were in small groups while interacting with Alexa. This was a challenge because the students all wanted to talk at the same time. Some groups quickly became frustrated and argued about who should interact with the Echo Dot. However, finding time for students to all have a chance to interact with the device independently

can be challenging as well. Some students would take so long that others wouldn't get a chance, which created hard feelings. The best situation seemed to be pairing two students together to take turns.

Another challenge that seemed to be recurring was the fact that students struggled to get answers from Alexa. This became evident as we read the feedback provided by the students. Students were frustrated by the fact that they felt Alexa could not understand them. In this situation, students would continue to repeat their question, often times growing slower and louder with each repetition. If they were able to get an answer from Alexa, their feedback indicated that the response was stated too quickly or was too lengthy to understand. For this purpose, students agreed that an iPad was generally easier when trying to find information. Over half (58%) of the groups responded that they would choose to use an iPad over the Echo Dot if given the option due to the frustrations they were experiencing. Nevertheless, it should be noted that only about a quarter of students (26%) disliked interacting with Alexa, despite these setbacks. However, it may be a good plan to have other options available as an alternative, so that frustration doesn't impede the overall outcome of learning. As we previously saw in Table 2, students benefited from having these other options available when they overwhelmingly chose the computer over any other device (59% of the time). Depending on the group of students, this could change. We felt that our students may have gravitated towards this option simply because of the way our schedule is set up at our school. Students receive one hour of instruction each day that is dedicated to the computer, thus their comfort level with this device would be higher.

There are some hurdles that we identified, which really did not have solutions, and need to be mentioned. First, students tended to struggle with instant gratification. Through observations it was noted that students were inclined to want to give up if Alexa couldn't answer

their question immediately. Also, we found that students with low verbal or speech skills found it more difficult to be understood. Although the interaction provided an opportunity to practice improving speech skills, in the classroom, within the eye- and ear-shot of peers, was a challenging environment for growth and often resulted in disengagement with the device in general. Additionally, the lack of output control was an issue at times. Though this is an issue with almost any technological device that students interact with, the element of Alexa's speech interpretation was an unforeseen drawback. At times, students meant to ask something appropriate, but Alexa responded with a similar, yet inappropriate topic. This is something that a teacher just needs to be aware of, so they can tell Alexa to "stop" the response before too many ears hear it.

Though a bulk of these suggestions and cautions resulted from negative interactions with the Echo Dot, it is equally important to note the positive outcomes that came from having the device available in the classroom. The students enjoyed using the Echo Dot more for smaller tasks. When we were having class discussion, the Echo Dot served as a quick reference for questions that could enrich the content being taught but weren't necessary for the instruction. If Alexa didn't know the answer, the class could still go on, and students could be challenged to find the answer at a different time with a different device. Often times, we found that students asked to use the Echo Dot to help them with spelling words and synonyms as well. This was helpful for both the students and teachers alike. Additionally, we found it to be a useful tool for classroom management tasks, such as using it to keep time or set alarms, to play music, and to read to the students. Alexa also has a plethora of skills that could be used for various classroom activities.

Sixth Grade English (Timmons)

Approach

In my sixth grade English classroom, I allowed students to find ways to use the Echo Dot for academic purposes. I offered suggestions for use, such as for spelling assistance and synonyms for writing assignments; otherwise, students were free to explore ways to use the device. As their teacher, I used the Echo Dot as a management tool and for homeroom activities.

Narrative

I introduced the Echo Dot at Back to School Night and informed parents that I planned to use the artificial intelligence in my classroom as part of my graduate school research study. Students and parents signed a consent form if they did not want to be part of the research. After establishing my classroom routine, students were encouraged to explore opportunities to use the Echo Dot as they saw fit. Students would ask to ask Alexa a question, and I would monitor their use. Students would ask Alexa to help with spelling, offer synonyms, define words, tell a joke, play music, and ask questions pertaining to other academic areas, such as science.

Analysis

I found the Echo Dot to be helpful as a classroom management tool, and it helped students to work independently. I was able to help more students during the class period as students could ask Alexa simple questions (spelling, synonyms) while I worked with other students. The timer was also helpful as students seemed to pay more attention and stay on task when they knew an actual timer had been set. Having Alexa pick a random number made class a bit more exciting as students never knew when they would be picked to answer a question or to complete an activity. On the other hand, while the “choose a number” skill was exciting for some students, others were visibly nervous that they would be called on (and I was concerned that my

shiest students would be uncomfortable when called on). The students, however, did well when called on at random.

During my SI (student improvement) time, students would often listen to relaxing or classical music while they worked. We would also use the *Simon Says* skill during homeroom, ask Alexa to tell jokes, check the weather, and ask Alexa random questions (for our own entertainment).

When I first started using Alexa, I was excited at the possibility of it being more of an academic tool in my classroom. During the course of the school year, however, I found it worked best as a management and entertainment tool. Students were responsible with the device, used it appropriately, and found it helpful with simple questions. They would become frustrated when Alexa would respond too quickly or with a long, drawn-out answer. Some students were able to reword their questions when Alexa did not respond appropriately, which I believe is a good, higher-level thinking skill. They were able to pose a well-worded, specific question to elicit a worthy response. On the other hand, some students struggled with not having a visual response. Their listening skills were put to the test as they had to listen to Alexa's sometimes lengthy responses and pick out the information that best matched their question. This frustrated some students, while encouraging other students to revise their question.

I have enjoyed having the Echo Dot in my classroom as it has been a helpful classroom management tool. Though there are other ways to track time, choose volunteers, and find correct spelling of words, the Echo Dot is current and engages students.

Eighth School Science (Shilvock)

Approach

In this case, Alexa was used in an 8th grade Earth Science classroom with an average of 120 students throughout the year. Parents were introduced to Alexa on Back-to-School night, and students were introduced to her on the first day of class. Students were briefly introduced to how to interact with her, including how to ask her questions, how to stop her from talking, and tips for asking questions. For the most part, students were encouraged to use her however they found her to be helpful with minimal direction from the teacher. I sought to understand how students would organically decide to use Alexa in the classroom, letting them decide how she impacted their learning. Twice throughout the year I did a more teacher-directed approach when using her for metric conversions and the skill NASA Mars to see how that would impact student usage.

Narrative

At first, students were encouraged to explore how they could use her in class. She was not hooked up to music as I used a different Amazon account than my personal one with Amazon Prime included. This meant we used her in class in a more simple manner, mostly as a timer or to inform us of the weather outside. Personally, from a teacher's perspective, I used her "Shopping List" function most often when I ran out of lab supplies. She was used in a more direct approach during the metric system and astronomy units. During the metric system, students used her as a check to make sure their conversions of how tall they were in centimeters made sense with how tall they knew they were in feet and inches. Later in the year during the astronomy unit, we utilized the skill "NASA Mars" to ask questions about Mars that students were curious about as well as a way to help students feel more comfortable interacting with her.

Analysis

I kept track of interactions with Alexa each day used, a total of 32 days, in three categories: distracting, useful, and personal. Distracting were questions asked throughout the day

that did not relate to anything academic or useful to class goings-on. These may include questions like asking her to sing random songs, repeat a phrase common to eighth grade lingo at the time, or set random events or alarms that I did not ask to be set. Useful were questions pertaining to class content or questions that students wanted to know asked at appropriate times. These may range from checking answers when allowed during class, asking the weather, or asking about random science questions at appropriate times. Personal is how I used Alexa. This was usually adding things to her shopping list that I needed for class like Expo markers or lab supplies, starting a timer for an activity, or setting an alarm or reminder for something I needed to do at a particular time. In the 32 days analyzed, Alexa was personally used 11 times, had 78 useful questions asked, and was characterized as distracting 183 times. She was also unplugged twice during this time due to excessive distractions, both times during a study hall class period not actual science class.

Students were also asked several questions about Alexa in their end-of-course evaluation. Out of the 102 students who responded, 32 (31%) stated that they asked Alexa education-related questions, 47 (46%) felt that Alexa was helpful if the teacher was not available to answer questions, 39 (38%) felt comfortable asking Alexa questions in class, and only 19 (19%) felt that she was more distracting than she was helpful. [Add any qualitative data about what students said about her usefulness to their education??]

I attribute these distracting challenges with Alexa in my classroom to three areas: the age level taught, the class level taught, and the lack of available skills Alexa had at the time. Eighth graders are known for pushing the envelope and wanting to seem funny to their peers. Asking questions from an eighth-grader's perspective can be seen as being dumb, a big no-no in the social hierarchy of upper middle school. My science class is also at a level that deals with

analyzing information, which meant that emphasis was on students using the information at hand to analyze cause and effect or implications. This is upper level thinking that Alexa is not capable of, nor did I want students to just be able to Google answers. They were highly encouraged to use logical thought, and I was unable to determine a way to use Alexa to help scaffold this complex process. I also think that there are many skills that Alexa could have in the future that would be highly beneficial to education, they just do not exist yet. I think back 15 years when Google Docs first came out, and the technology was not what everyone hoped it would be yet. However, Google Docs is an incredibly successful platform with a plethora of applications, especially in education (case in point, Google Classroom). I feel that Alexa will also follow that trend, it just does not have the technical capabilities yet.

High School German (Steinmetz)

Approach

High school students were given the opportunity to try Alexa in my German classroom. As their teacher, I wanted to make sure that Alexa was useful and would assist in their second language acquisition. I was a bit unsure how we would use Alexa in the class and make sure that she was contributing to progress in the curriculum. In other words, I knew she would be interesting to the students, but I was unsure how she would contribute to our progress in learning German. I did want her to contribute to and not distract from the curriculum. When first using Alexa, the students were impressed that she knew German. Secondly, they were a bit intimidated by the pace and knowledge of her German which was at times too advanced. . Students were interested in getting quick information from Alexa from English to German. They found that some of their trial and error with the device ended in more of a search than a find. For instance, when asking Alexa for a word from English to German using “Translated”, they found that she

indeed knew the German word but they weren't sure how to spell it. In order to see the spelling, they went to the front computer in the classroom to check it out. Some students were curious, others were not, as we know in any classroom, motivation is varied. So in this respect, I felt that not all students were benefiting from the device in this regard. I also felt that I needed to hold them responsible for what they were learning from her, so I came up with ways to have them document the information coming from the device. They had to use their listening skills to determine what information they were comprehending and then they had to record what they heard. I did this through a weather lesson in the German I classroom. Details of this are explained in the narrative below. However, sometimes quick information like looking for genders in the target language proved to be a quick and useful tool through Alexa for their poetry project. Other lessons were used for reinforcement. For example, after having learned information in a Unit on "the city" in German, students were able to listen to Alexa use these familiar words in "Rosetta Stone". Alexa also sharpened the students speaking abilities. If they did not speak German clearly and precisely, she would tell them she did not understand. This proved to be frustrating at times but it challenged them to be better. The skills used with Alexa were varied; "Translated", "Rosetta Stone", and Alexa in German were among the favorites.

Narrative

"Translated" gave the students the ability to ask Alexa for the German word of certain English words. When writing their poetry, this served the students well. In learning German, the gender of a word is of utmost importance and so they found it quick and easy to ask her for the word and its gender by using "Translated". They simply asked her for the English word with the article "the" attached to it to get the correct gender they needed. They were looking for the German *der, die, or das*. So they caught on quickly that they needed to say "*the bird*" and not

just “bird” in order for Alexa to give them the *der, die, or das* that they were looking for and in this case *der Vogel* (the bird) was given. Once they had the gender, they were able to know how to use it in their poem. “Translated” became very valuable in retrieving genders for this project.

“Rosetta Stone” was another skill used by the group for reinforcement of words already learned in German. After students had already learned vocabulary to do with getting and giving directions in German, they were able to hear these words in German with Alexa. This skill allowed the students to hear what they had already learned and were able to repeat the phrases with Alexa and build on those phrases with new vocabulary. For example, by choosing the topic “Food and Drink”, the student will be asked to repeat the word/words/or phrase that Alexa used. Something also notable here was that Alexa asked the students to repeat the word or phrase but did not reject their response. This was a welcome feature since in other skills, their German had to be very accurate in order to proceed. Once they repeated it twice, they are able to build on that word or phrase. Alexa takes them through various vocabulary both learned and new. This was a great tool for reinforcement of what they had learned and a good source for new information in the target language.

“Alexa in German” was an advanced skill used to emphasize the importance of correct pronunciation in German. This skill demanded that the students speak to her in German and that they use correct German both grammatically and in pronunciation. If they did not use the German words clearly and precisely, Alexa would indicate so and would not give them an answer for proceeding. For example, students were given a worksheet with two questions on it to do with weather. One asked Alexa how the weather was in a certain town. The other asked for the temperature in the town. Students had to alternate using the two questions. This repetition proved useful as the students grew very comfortable asking the question for weather in German.

The word for temperature had been difficult for students to say in past years of teaching. With the repetition they got with Alexa, they were very good at saying it and very comfortable with it. This proved to me the value Alexa can have in learning a second language. Some students were proud that they were better understood than their peer counterparts; students were given a survey questioning their level of comfort with Alexa. Some indicated confidence with it and others some level of frustration as she did not always understand their German. This skill was also useful for a listening component. Advanced language learners could ask her about certain individuals or facts in the target language and receive lengthy responses where they had to use their listening skills to understand the information coming at them at a fairly fast pace. They had the option to repeat the question again in order to grasp it a second or third time. It also brought to the surface vocabulary words or phrases that they did not understand or had never learned prior.

Analysis

Alexa proved overall to contribute to my curriculum in all areas of learning a second language; listening, speaking, some reading (from the computer), and writing and recording. Alexa proved to be a useful tool once I figured out what I wanted to use to move my curriculum forward and to assist the students in their second language acquisition.

Conclusion

Commonalities:

- Spelling (lower)
- Weather (primary grades)
- Rechecking answers (upper)

- Classroom management (timer)
- Free choice
- Indoor Recess
- Music
- Synonyms (ELA teachers)
- Learning facts, both fun and content-related
- Self-Consciousness in upper grades

Differences:

- Names for Echo Dot, not all assigned gender
- Teacher reminder and alarms
- Centers/Stations
- Choosing a student (random number)
- Reading to students through Audible and Amazon Storytime
- Brain breaks (lower/upper)
- Student surveys, reflections, input
- Frequency of use in classroom/by students
- Echo Skills

Conclusion

Though each experience was slightly different in itself, some commonalities and differences were found among the various sections of research. Some of these were experienced between groupings of students that were similar. In general, there were more grouped commonalities between lower grades and intermediate grades, while middle-level grades and

high school found similar uses for the device. Additionally, there were some commonalities that surfaced among students with similar learning styles or abilities.

Teachers in the primary grade levels commonly used the Echo Dot for indoor recess activities, free play, music, and checking the weather each day. Using the Echo Dot for spelling and synonyms were common practices in the elementary, intermediate, and middle school grade levels, while checking answers and using the artificial intelligence for classroom management purposes was beneficial for older students. Overall, teachers noted a decrease in student interest as the school year progressed. Additionally, teachers noted that students with speech difficulties struggled with using the Echo Dot and students at each grade level would become frustrated when Alexa did not understand their questions. Furthermore, the speed at which Alexa responded caused some students to stop using the device.

Differences in use of the Echo Dot were noted as well. First of all, not all grade-levels assigned a gender to Alexa. Some did not refer to Alexa by name while others referred to Alexa by another name, such as a classroom-created name. Students in the upper grade levels (intermediate and higher) were more self-conscious when using the Echo Dot as they would turn the volume down and speak very quietly as to not bring attention to themselves. Teachers in the primary and intermediate grades utilized the Audible and Amazon Storytime skills as a way to help students increase their reading skills and for reading enjoyment. Overall, Alexa was not a transformation tool, but there were benefits to having the device in our classrooms. More research is needed to understand what benefits voice assistant technology might hold for classrooms. Future research could further examine long-term effects of students speaking with the devices, cultural differences in uses, and specific inquiry into certain programs and skills being put into use.

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