



## IMPROVING TECHNOLOGY TO WORK WITH GIFTED CHILDREN. A REVIEW OF BEST PRACTICES AND EMPIRICAL RESEARCH

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<https://doi.org/10.5281/zenodo.6487783>

**Abstract:** The article aims to explore the progress of technology use in gifted education and highlight the best practices and empirical research in this area. The literature on the use of technology with gifted students and their teachers has been extensive, with articles on best practices, but the empirical research in this area is still emerging. With the increasing interest and awareness about integrating technology, this review will be useful for helping teachers, practitioners, and researchers understand how technology has been used in different areas of gifted programming, including learning and development, assessment, curriculum, learning environments, and professional development. The authors also discuss the current research on technology use in general education and offer suggestions for future research in this area with gifted children and their teachers.

**Key words:** Computers, best practices, technology, gifted, talented.

Gifted education began in the United States in the late 1800s but didn't gain momentum until after the launch of the Russian satellite Sputnik in 1957 (Davis, Rimm, & Siegle, 2011). Today, each state in the United States has its own method of educating gifted students, but most states operate using the federal definition of gifted and talented: Gifted children are those identified by professionally qualified persons who by virtue of outstanding abilities are capable of high performance. These are children who require differentiated educational programs and services beyond those normally provided by the regular school program in order to realize their contribution to self and society (as cited by Davis, Rimm, & Siegle, p. 18).

Technology for Learning and Development



The major themes in the research articles that focused on technology's role to support the learning and development needs of gifted children included an understanding of how their attitudes toward technology can affect their learning (Kahveci, 2010), computer-aided instruction using educational software (Dixon, Cassady, & Cross, 2005; Grimes & Warschauer, 2008), and an understanding of how technology influences their socio-emotional development (Yun, Chung, Jang, Kim, & Jeong, 2011). Attitudes toward technology. Gifted students should have a developmentally appropriate understanding of their needs and how their beliefs influence their learning and behavior (NAGC, 2010). In a survey on the attitudes of gifted high school students toward technology usage (Kahveci, 2010), the majority of the participants reported that using technology was very relevant to their learning and that they used technology tools regularly in their everyday lives. Students in lower grades were more satisfied with using technology for learning than those in higher grades. When questioned on their confidence with using technology at an advanced level, female students reported lesser confidence than male students. However, all the participants indicated that they would not feel discouraged to let others know if they performed well in technology use and reported high interest in problem solving using technology.

This article covers the main place of small business and business in today's market economy. Including scientifically analyzed the development of small business and business, and the legal basis, at this time financially support small business and business, the latter is amended and the rules for this branch of national legislation are added.<sup>1</sup>

#### Computer-aided instruction.

Dixon et al. (2005) examined whether using computer tools helped to improve gifted adolescents' critical-thinking skills and quality of writing. They compared the critical-thinking abilities of gifted adolescents in two types of writing samples: handwritten and computertyped essays. They found that using computers was more effective for gifted boys, as they showed an 83% increase in the number of words in their computer-typed essays when compared to their handwritten essays. The authors suggested that the benefits of

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<sup>1</sup> Tolibjonovich, Madumarov T., and Gulomjonov O. R. Ogli. "Lombard Microcredit Organization Its Concept and Its Importance Today." *JournalINX*, vol. 6, no. 10, 2020, pp. 109-111.



software for gifted boys were speed and efficiency. Consistent with the majority of research regarding girls' inclination toward English and language arts, gifted girls scored better than the gifted boys in handwritten essays. However, when they used computers to write their essays, the gifted boys were able to score similar to the gifted girls. Grimes and Warschauer (2008) believed that allowing students to use laptops at both home and school has the potential to bring useful resources to the student instead of students going to the labs for a part of the school day. In their study, using laptops facilitated project-based learning and resulted in an increase in student initiative. None of the gifted learners reported that laptop use hindered their learning, whereas 97% reported a positive learning experience. Technology to meet socio-emotional needs. Helping students become fully aware of social and emotional needs is crucial to their overall development. For the past decade, the increasing use of e-mail, chat, and blogs has influenced the experiences that gifted students face. Yun et al. (2011) used an online game called The Ultimatum to determine if gifted adolescents lacked in their social and emotional skills. This game is a decision-making game with two players—one who offers money and another who either accepts or rejects the offer—with a goal of earning more money. Gifted students were better than the average students in strategic decision making but lacked in the social aspect of the game, where they had to cooperate with the other player to earn more money in the game. They earned lower than their average-ability peers, as they were more sensitive to unfair money dealing in the game.

#### Curriculum and Instruction Planning with Technology

Common themes on using technology in the curriculum included differentiating instruction to equip gifted students with 21st century skills, such as inquiry skills (Dove & Zitkovich, 2003), problem-solving skills (Liu, 2004), critical thinking (Duda, Ogolnoksztalcacych, & Poland, 2010; Gadanidis, Hughes, & Cordy, 2011), and self-regulating skills (Greene, Moos, Azevedo, & Winters, 2008), and for scaffolding their learning (Gentry, 2008; Igo & Kiewra, 2007). The findings from a study focusing on math curriculum (Duda et al., 2010) recommended that the use of technology should facilitate open-ended problem



solving that allowed students to think critically. Gifted adolescents in this research worked with graphing calculators and emulator programs to solve equations. The use of graphing calculators also allowed the students to explore new concepts unfamiliar to them and helped them obtain a concrete understanding of math theories and problems. Another study (Gadanidis et al., 2011) reported similar findings: Middle school students who participated in short math program were actively engaged and enthusiastic when they worked with online plotting programs. The students were eager to share their results with each other. The digital drawing tool allowed students to express their math understanding visually. One example that Gadanidis et al. noted was how a student related a drawing of a side view of an open book to a semicircular prism. Use of technology in science curriculum (Dove & Zitkovic, 2003) was also effective, as gifted elementary students in the classroom were highly proficient in using mobile communication tools. In this project, children used digital cameras and palm-held computers as they worked through five workstations set up to learn about the environment. Educational technologies were used not only to improve the gifted students' inquiry skills, but also as scaffolding tools. The authors noted the need for proper training, as the students performed better with technology tools for which they were given prior training. In another social studies classroom, Gentry (2008) found that e-publishing was effective for young students for creating student-authored books. All students showed improvement in their assessments, and gifted students improved the most. With the increasing use of Internet resources for referencing and taking notes for class assignments, in a similar study, Igo and Kiewra (2007) aimed to study how high-achieving students used note-taking software to perform "copy and paste" note-taking from online resources. Even when there was no restriction on the amount of text they could copy and paste, they were selective in what information they used from the Internet for note-taking.

#### Technology in Varied Learning Environments

An effective learning environment for gifted students should be learner centered, encourage independence and innovation, offer various grouping options, and be flexible (Nugent, 2001). Studies on the effectiveness of online courses have reported several benefits for gifted learners and positive perceptions about learning online. In a study by Wallace



(2009), younger gifted students and their parents were surveyed to examine whether online coursework can be effective for younger students. The younger gifted students indicated strong interest in the subject area of the online course and considered the online course less demanding than older gifted students did. Although these students rated their online instructor as highly helpful, they felt that using the software for online learning was difficult. The final grades indicated that young learners scored well and that the majority reported an increased interest in the subject. The parents of these children were satisfied that the online course was appropriate for their young children. The authors suggested that because teachers could not notice confusion during online instruction, students should be proactive in asking for help. In a related study, one of the main factors that parents perceived as the benefit of online learning was flexibility (Blair, 2010). In this study, parents reported that the online courses were flexible, in that their children (middle and high school) could take courses that were not offered in their schools as well as additional courses in their areas of interest, could accelerate through the curriculum as opposed to spending nine months in a traditional classroom, and could attend from home at a convenient time, which allowed the students to explore their other interests. Social aspects of the online classroom that encouraged students to be more open to offer ideas and opinions and interact with like-minded peers from different parts of the country were also deemed important. Similar positive reactions to online learning were obtained from gifted adolescents. Olszewski-Kubilius and Lee (2004) researched why gifted adolescents preferred online courses and reported several reasons, such as desire to learn more about a particular content area, unavailability of face-to-face courses offered at their school, desire to study at their own pace or to get ahead, ability to gain advanced placement credit, and desire for extra coursework that they could not fit into their regular school schedules. The gifted adolescents liked studying advanced and challenging, self-paced online coursework. Bohmova and Rostejska (2009) examined the effectiveness of an online chemistry course for gifted high school students, TALNET Online to Science, and found that properly organized online courses can increase the knowledge and problem-solving skills of these students. The gifted students enjoyed learning online and felt the skills they learned will be useful for their upperlevel



studies. On their research on identifying the appropriate pedagogy for online learning for high-ability students, Ng and Nicholas (2010) outlined several important features that they observed during their research. Creating a virtual thinking community is possible through online courses, as they offer time to critically think and reflect. However, they found that online courses will be more beneficial if students progress from a structured to open learning environments, as the task completion rate was 75%, compared to just 25% when students were offered a totally open learning experience. They also noted the importance of the teacher's role to facilitate online learning. Online discussion forums can be integrated in the curriculum to provide students more opportunities to think more deeply. For instance, in their study with middle school math students, Gadanidis (2011) integrated an online discussion forum called Idea Construction Zone, which not only offered a forum for collaborating with text messages, but also allowed students to include multimedia components, such as images and videos. Students also benefited from using editable wikis that allowed them to share their views and give/receive feedback from their peers. Students were actively engaged and eager to share their results with each other. Visual images and videos encouraged more communication.

Most researchers and practitioners have strongly discouraged using technology merely for drill and practice (Dixon et al., 2005; Siegle, 2003), as they emphasize using technology for advancing 21st century skills, such as critical thinking, creativity, and problem solving. Most important for gifted students, the use of technology should be geared to meeting not only their learning needs, but also their social and emotional needs (Cross, 2004; Cross, 2005) to help gifted students feel a sense of belonging and connection. Technology strongly influences the everyday life of today's students, and their learning experiences in school should reflect this to prepare them for their futures. Based on our review, we observed that the research on technology use for gifted students and their teachers is minimal. Evidently, there is a need for more empirical research on using various technology tools and assessing their effectiveness for teaching gifted children. With the increasing interest and awareness about integrating technology, more research in this area will build a strong and quality education for 21st century learners.

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