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THE ROLE OF TECHNOLOGY IN GIFTED STUDENTS' MOTIVATION

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Although technology by itself may not be motivating, a relationship seems to exist between the opportunities that technology presents and motivation for gifted students. When technology use aligns with authentic or "real-world" applications, motivation can be enhanced. This article explores the overlap between factors that have historically been shown to increase motivation and the unique affordances of technology tools to meet the needs of gifted and talented students. Some examples of this overlap include skills related to control and autonomy (e.g., time management, project management, and decision making about choices provided), challenge (e.g., perseverance and patience through hard work, proposing a project and following it through to completion), collaboration and cooperation (e.g., teamwork, people skills, social skills, anger management, and communication with students at other schools), curiosity (e.g., finding resources online, finding the work interesting, and learning new things), and recognition (e.g., the opportunity to communicate beyond the school walls, a "real" product). © 2012 Wiley Periodicals, Inc.

There is evidence that certain types of technology-enhanced environments provide affordances that support and engender intrinsically motivated learning (e.g., Gee, 2003; Malone & Lepper, 1987; Reynolds & Caperton, 2011). It is not, however, the technology itself that enhances motivation. Students who are considered "digital natives" (Prensky, 2001) do not use technology for the sake of technology use. In other words, they are not using it "just because it's digital." These "new millennium learners" (Pedro, 2006) utilize technology as an integral part of life, both in work and play, and therefore do not view technology use as an opportunity but, rather, as a fundamental tool for normal day-to-day functioning.

This suggests that the factors that influence internally motivated action are similar regardless of the mechanisms. So whether one looks at motivation through a lens of autonomy and relatedness (Ryan & Deci, 2000), a parsimonious view that includes challenge, fantasy, curiosity, control, cooperation, competition, and recognition (Malone & Lepper, 1987), or more historical views of competence and challenge, optimal arousal, or control (Csikszentmihalyi, 1975; deCharms, 1968; Piaget, 1952), these motivational factors must overlap the affordances provided by technology-rich environments.

Consider the work of Reynolds & Caperton (2011). In an educational pilot, 199 students, from middle-school to community-college level, elected to participate in a learning opportunity that required each student to actively develop a web-based game online. As part of the learning experience, students learned and utilized transferable, authentic skills by engaging in a self-directed learning process to independently create a game. The process involved peer-to-peer learning through online interactions and access to professional game designers to scaffold learning and provide the necessary tools and information as needed. Students had to learn new software, collaborate, and make decisions about any number of technology and design concerns. Students participating in the pilot provided feedback during the middle of the semester-long program and at the end of the program. The feedback identified the same types of "authentic and transferable" skills that are necessary for self-motivated success. Some examples include skills related to control and autonomy (e.g., time management, project management, and decision making about choices provided), challenge

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(e.g., perseverance and patience through hard work, proposing a project and following it through to completion), collaboration and cooperation (e.g., teamwork, people skills, social skills, anger management, and communication with students at other schools), curiosity (e.g., finding resources online, finding the work interesting, and learning new things), and recognition (e.g., the opportunity to communicate beyond the school walls, a "real" product).

Students in this study (Reynolds & Caperton, 2011) also perceived that the learning that was occurring in the game development environment differed dramatically from what they experienced in their more traditional educational settings. Students suggested that their experience in designing games made learning fun and not boring, that they were more productive, and that the work was interesting. The learning experience itself, not unlike that espoused by gifted education for the last 25 to 30 years, required students to engage in work that resulted in products, with an audience that is outside the classroom or school; required students to engage in challenging work that could not be completed without support; and required students to use the conventions and tools of a professional field while providing choice and autonomy as students endeavored to solve a complex problem with no one right answer (e.g., Ericsson, 2002; Feldhusen, Van Tassel-Baska, & Seely, 1989; Renzulli & Reis, 1985, 1997; Tomlinson et al., 2002, 2009; Vygotsky, 1978). This example demonstrates that the kind of work is as important, if not more important, than the tools used to complete the work. What motivated students was not the use of technology, but rather the opportunity for control and autonomy, challenge, cooperation, just-in-time knowledge (i.e., knowledge driven by curiosity and need), creativity, and recognition as products were provided for authentic audiences.

Despite the fact that the same factors influence motivation regardless of the tools being used, it is also important to recognize that "today's students take for granted and expect technology which merges seamlessly into their work and play" (Arnone, Small, Chauncey, & McKenna, 2011, p. 190). Technology-pervasive environments enable students to function differently and more expansively, putting the power and control of learning in students' hands.

Control/Autonomy

Some degree of autonomy, the extent to which one has choices about what to do and when to do it, has been shown to increase intrinsic motivation (e.g., Corno, 2004; Hardre & Reeve, 2003; Ryan & Deci, 2000). Students' perceptions of the autonomy-supportiveness of their school librarian have also been associated with intrinsic motivation to engage in research (Arnone, Reynolds, & Marshall, 2009). In a qualitative study (Myllari et al., 2011) identifying the use of information and communication technologies as meaningful and motivating for learning, 7 of 8 boys and 5 of 13 girls identified choice as an important aspect of their intrinsic motivation. Because the sample size of this research study was small (13 girls and 8 boys), it did not provide a lot of opportunity to identify the variation in students' comfort with autonomy, which became an important factor in the game development pilot (Reynolds & Caperton, 2011). As a result, Reynolds and Caperton (2011) suggest that autonomy in technology-rich environments may be cultivated more effectively through an escalating approach to increasing autonomy. Initially, the illusion of choice may be sufficient to engender feelings of autonomous control but as the learner increases resiliency and self-reliance, more choice can be provided, ultimately leading to greater autonomy.

Searches on the Internet

Students today have an unprecedented access to information and technology providing choice and the opportunity for autonomy, but not necessarily support that leads to efficient access to information. Thanks to the Internet and search engines like Google, information regarding almost any topic or area of interest is accessible if only one understands how to frame the right

question. Ubiquitous among today's teenagers, cell phones have transformed from devices simply used for phone calls to Digital Information Devices capable of accessing and sharing information with the world from the palm of one's hand. However, with all of this access comes a great responsibility.

Today's students must be able to navigate an increasingly complex network of information and misinformation. We mistakenly take it for granted that our tech-savvy teens are able to effectively use the Internet for not only locating information but for comprehending and assessing the quality of the resource. Several studies have detailed students' inability to evaluate the validity of Internet sites, sometimes claiming that fictitious reports about Velcro crops and reproductive cloning agencies such as "Clones-R-Us" are reputable sources (Coiro, 2003). The New Literacies Research Team at the University of Connecticut has repeatedly found a disconnect between students' ability to read and comprehend traditional texts and their ability to search and evaluate information on the Internet (Leu et al., 2004; Leu et al., 2007).

Access to limitless amount of information can lead to overload or what Alvin Toffler (1970) described as future shock. To combat this disorientation, a set of New Literacies must be developed in order to better navigate the Internet. When searching for information online, students must first be able to effectively identify important questions in order to compose a set of proper search terms. Once the results of a search are returned, students must be able to locate the information that they are seeking on the results page and determine which link to click on to find the information they are seeking. After arriving at a webpage, students must then critically evaluate the information for understanding, relevancy, accuracy, reliability, and bias (Coiro, 2003). Finally, students must be able to synthesize the information and then communicate the answers to others utilizing a variety of Internet based tools.

If one understands how to search, then one has control and the ability to find the answers to the questions that intrigue them. To enhance one's ability to search, Google offers a series of lesson plans designed to teach students how to become better searchers, found at http://www.google.com/insidesearch/searcheducation/index.html. Although the lessons here are designed to introduce learners to strategies and techniques for more effective Internet searching, Google also offers search challenges at http://agoogleaday.com/. These daily questions are designed to test one's ability and efficiency in locating information on the Internet in a race against time to find the correct answer. Gifted education has long featured such puzzles and brainteasers as part of its curriculum, as gifted students typically respond positively to these challenges.

Otta and Tavella (2010) had 40 third- through fifth-grade students grouped by ability play digital mind games for about 1 hour per week during regular school hours. The results of the study, controlling for novelty effects, indicated that high-achieving students were able to demonstrate greater autonomy and competence than low-achieving students in computer-based learning tasks and that intrinsic motivation in computer-based learning tasks was highly correlated to both actual competence and autonomy (Otta & Tavella, 2010). When competence, and therefore the ability to autonomously complete a task, was at a high level, intrinsic engagement and motivation were high. However, when competence diminished (i.e., the student could not successfully complete the learning task), engagement and motivation were also diminished.

The importance of appropriate challenge, particularly with high-ability students, cannot be overstated. In the same study (Otta & Tavella, 2010), if competence was high and the task was completed too easily, the relationship to satisfaction and continued engagement also decreased. For high-ability students, higher levels of competence in a task may lead to less satisfaction with the learning experience, potentially affecting motivation in the long term (Otta & Tavella, 2010). Although the sample was small, it highlights the unique need for highly able students to be appropriately challenged and further supports the idea of optimal stimulus or challenge and control being

necessary to maintain motivation for learning (Ryan & Deci, 2000; Malone & Lepper, 1987; and Csikszentmihalyi, 1975).

Challenge

Seymour Papert (2002), inventor of the Logo programming language, suggests that activities are fun when they are hard, or more precisely, fun *because* they are challenging, not in spite of the fact that they are hard. Challenge, however, is a very tricky thing. Too much challenge results in frustration, and too little challenge results in boredom, both of which are antithetical to intrinsic motivation. With that said, challenge within one's zone of proximal development (Vygotsky, 1978) is invaluable because success in a challenging situation increases intrinsic motivation (Deci & Ryan, 1992; Dweck, 2000).

Gifted students pose a unique opportunity for educators as to how they relate to challenges. Because gifted students are capable of achieving at high levels and growing at a pace that is often accelerated compared with their same-age peers, the challenges they encounter need to escalate with a rather steep trajectory to maintain continual growth. Often, this kind of Ascending Intellectual Demand (Tomlinson et al., 2009) cannot be achieved in regular classroom settings. Technology, specifically Internet communication technologies, provides unique opportunities for gifted students so that acceleration and enrichment options can be made available.

Online Courses and Programs

Although the level of available resources and teachers may be limited in many school districts for adequate challenge for many gifted students, many online programs and courses for gifted students are available. The most established and perhaps the most well respected of these types of programs have evolved from university-based talent development programs.

The Center for Talented Youth (CTY) at Johns Hopkins University was established by Dr. Julian Stanley in the 1970s as a means to identify, challenge, and reward academically talented students. Since that time, the available program options have greatly expanded. CTYOnline (http://cty.jhu.edu/ctyonline/) currently serves more than 10,000 students each year and offers a range of challenging academic courses for eligible gifted students in grades pre-kindergarten through 12. Courses are offered in a variety of formats, including individually paced, session-based, and flexi-paced courses.

The Education Program for Gifted Youth (EPGY) at Stanford University (http://epgy.stanford.edu/) was established in the summer of 1992 as a computer-based distance learning program for gifted and talented students. Since that time, more than 50,000 students have taken courses through the program. EPGY offers a variety of courses for students at the elementary, middle-school, and high-school level. One of the primary goals of EPGY is to provide access to advanced courses, including Advanced Placement (AP) courses, to students whose schools may not offer such services.

Northwestern University Center for Talent Development's Gifted LearningLinks (http://www.ctd.northwestern.edu/gll/) offers a continuum of online services for students at all grade levels and served more than 1,500 students last year. The offerings include courses designed for families with students in kindergarten through Grade 2, enrichment courses and core essential course for students in Grades 3 through 8, and extracurricular clubs based on student proposals. In addition, honors elective courses, honors, and AP courses are available for students in Grades 6 through 12 featuring monthly start dates.

Additional options lie beyond students taking a course or two from one of these university-based gifted programs. As a result of the varied academic needs of students, many states have developed entire virtual schools, allowing students the opportunity to complete courses on a nontraditional time table. Founded in 1997, The Florida Virtual School (FLVS; http://www.flvs.net/) was the first

statewide, Internet-based, public high school. The FLVS now serves students in kindergarten through 12th grade from across the United States and around the world. Florida residents are able to take the courses free of charge. Although not specifically designed for gifted students, the freedom and flexibility in scheduling can be utilized to address the motivational issue of challenge that is so attractive to many gifted students.

Online private schools, such as the Laurel Springs School (http://www.laurelsprings.com/our-families/gifted-talented/), have also emerged that specifically address and provide programming options for gifted and talented students and are designed to develop intellect and achievement while nurturing academic and personal goals.

A multitude of free online educational options in nearly every state are available as part of the Connections Academy (http://www.connectionsacademy.com). When considering any online option for gifted students, one should ensure that the program is accredited and that the course taken will be accepted for credit by the student's school of residence. The resources mentioned in this section should meet these criteria.

Open Course Ware

Beyond taking courses online for credit, the Internet offers numerous other opportunities for gifted students to encounter challenging and rigorous content. A growing trend among many institutes of higher education is the concept of open courseware, in which the entire contents of college courses are openly shared with anyone who is interested. Massachusetts Institute of Technology (MIT) OpenCourseWare (http://ocw.mit.edu) offers the contents, including syllabi, lecture notes, audio and video lectures, projects, assignments, and examinations, of more than 2,000 courses that have been actually taught at MIT over the past decade. Access to the content from MIT OpenCourseWare is absolutely free. However, one cannot earn credit for any of the courses. The OpenCourseWare Consortium (http://www.ocwconsortium.org) offers a collection of courses and materials not only from MIT but also from hundreds of universities from around the world.

An often-overlooked resource for addressing the issue of challenge for gifted students is iTunes U (http://www.apple.com/education/itunes-u/). Similar to the open course ware concept, colleges and universities such as University of California–Berkeley and Yale University and institutions such as the Museum of Modern Art and the Smithsonian have posted audio and video lectures of actual classes and made them available free of charge. Students are able to access these recordings online or download them to their computer, iPod, iPhone, or iPad. Through online resources such as these, gifted students are able to match their interests and passions with advanced-level content resources that will provide challenge and serve to advance the thinking of the individual.

Cooperation

When considering gifted students, the need for contact with peers who have similar interests and abilities is particularly important, not only to their sense of identity but also to motivation (Baylor, 2011; Phillips & Lindsay, 2006; Reynolds & Caperton, 2011). Further, it has been well established that feelings of belonging and acceptance, or social relatedness, are associated with increased engagement and intrinsic motivation (Ryan & Deci, 2000).

This is evidenced in technology-rich environments, as well. In a qualitative study identifying the use of information and communication technologies as meaningful and motivating for learning, more than half of the female participants identified relatedness as an important aspect of their intrinsic motivation (Myllari et al., 2011), highlighting the need for opportunities that involve cooperation and interaction with peers. Further, in the game design pilot (Reynolds & Caperton, 2011), students identified teamwork and opportunities to work with students from other schools as

important motivational factors at both the mid-point and the end of the participation in the game design course.

The intense passions and interests of gifted students may often be isolating experiences for those who are not fortunate enough to have physical access to like-minded peers. Internet technology allows multiple avenues for gifted students to create and manage connections with a variety of social groups based on areas of interest. It is in these venues that individuals can share thoughts and ideas and become active participants in a digital society and develop the skills of cooperation and collaboration.

Mentors

As with any learning experience, providing a scaffolded experience can help to more readily develop the individual. As gifted students explore their interest areas and learn to better cooperate with others, a mentor can prove to be a valuable resource. There are a variety of online resources available to help match gifted students with an appropriate mentor. National Mentoring Partnership (http://www.mentoring.org) provides a search directory of local mentoring programs throughout the United States. iMentor (http://www.imentor.org) is designed to connect high-school students from underserved communities with online mentors that utilize a curriculum-based approach for promoting academic success. Finally, the International Telementor Program (http://telementor.org) seeks to create collaborations between professionals and students by focusing on academic projects through electronic communication. Teachers and mentors are able to create projects based on interest and areas of expertise for a variety of grade levels. Unlike other mentoring programs mentioned here, specific projects are targeted to gifted and talented students, with a focus on collaboration and the production of a final project.

Partnering a gifted student with a mentor may serve as an important developmental stage in the process toward independently seeking out and establishing relationships that will foster cooperation and collaboration. Mentors can serve as an integral piece of a gifted student's personal learning network (PLN).

Personal Learning Networks

PLNs are those personal and professional connections that an individual creates with others in virtual environments. PLNs may consist of relationships with people that one knows in real life, as well as people that one has never met face to face but only knows because of their online presence. PLNs may also include connections to organizations, industries, or institutions. In a way that gifted students can relate to, PLNs have the unique quality of combining the complexity of thought and revealing the richness and variety of one's personal interests. A variety of technological tools can and should be utilized to construct a series of sources of information so that one can readily access new knowledge and information, as well as easily pose questions to like-minded people.

To begin a PLN, one might utilize Twitter to establish some initial online connections. Twitter (http://twitter.com) is an online social network that allows individuals to send and receive text-based posts consisting of no more than 140 characters, often referred to as "tweets." Individuals are able to compose messages that are publicly shared. One can choose to "follow" others to have their postings automatically appear on their Twitter account. In a sense, Twitter is a public forum in which anyone may choose to share items, such as random ideas, thought-provoking questions, and links to Internet resources or articles. As individuals develop and cultivate their Twitter connections by carefully choosing individuals or institutions to follow, the platform can evolve into a virtual space where a gifted student can interact with like-minded peers from around the world 140 characters at a time.

Whereas a feature of Twitter is pithiness, blogs allow individuals the chance to fully express the verbosity of their thoughts. Thanks to online platforms such WordPress, Blogger, and Tumblr,

anyone can create a powerful online presence to share their ideas and interests with the world. Institutes, organizations, and corporations frequently update blogs regarding initiatives, research, and innovations. To avoid having to visit multiple websites on a daily basis for the latest updates, one can utilize a tool such as Google Reader (http://www.google.com/reader) to subscribe to changes and updates made to the blogs that are of interest. This will create a centralized collection of new, personally selected information for one to cull through at leisure.

A third way to create a PLN is the use of social bookmarking tools, such as Delicious (http://delicious.com) and Diigo (http://www.diigo.com). These tools allow users to save websites of interest. Social bookmarking sites allow you to create or join groups based on common interests and then to share those sites easily with others. By working as a group, one is able to benefit from what others have found to be meaningful and important on the web.

Finally, numerous platforms have arisen that easily allow the connecting with others through social networks. Groups (www.facebook.com/groups) is an option on Facebook that allows anyone to create a public or private network. Users can choose to join a group based on almost any area of interest imaginable.

Social networking sites have established their capacity to connect, unite, and bring about change through collaborative effort. This is evidenced by the change demonstrated in the Middle East over the course of the last year. Social networking can also serve as a catalyst to a collective curiosity and provide vicarious reinforcement for individual curiosity (Arnone et al., 2011).

Curiosity

Technology-pervasive environments provide ready access to information and function to support both episodic curiosity as well as deeper levels of exploration. No longer is a question something deemed to be addressed at some future time, but rather, with ready access through laptop computers, iPads, and smartphones, information-level learning can meaningfully scaffold deeper and more complex meaning making, thus supporting and sustaining curiosity, which can be a powerful motivator.

Drawing on Arnone and colleagues' (2011) discussion of curiosity, interest, and engagement in technology-rich learning environments, one instance of curiosity, the desire for new information, becomes a multistage episode that can lead to deepening levels of interest and vice versa. The first stage of episodic curiosity is the trigger, which is a "stimulus characterized by uncertainty" (Arnone et al., 2011, p. 185). This is followed by reaction and a resolution. Learning is dependent on whether the episode of curiosity is satisfied or not. If the curiosity is not satisfied, learning in that instance does not occur, and the impetus for the next episode of curiosity is negated.

Technology affords curious gifted students with almost limitless opportunities for exploration and development of their interests. The shear amount of information and resources can be overwhelming. To help direct students toward potentially worthwhile and meaningful resources, it may be useful to explore one of the following resources.

In addition to selling music, movies, and apps, the iTunes store also features an extensive collection of hundreds of thousands of free podcasts to listen to or view online or to download to a portable media device, such as an iPod or iPad. iTunes provides a useful interface that allows one to easily search for areas of interest. Podcasts typically exist as a series of regular episodes recorded by an individual or small group and discussing a common concept or theme at length. Listeners may use iTunes to subscribe to a particular podcast and have new episodes automatically downloaded to their portable media devices. Students may choose to listen to one or multiple podcast episodes, depending on their level of curiosity about the topic.

Founded in 1984, TED (http://www.ted.com) is a set of global conferences that merge the fields of technology, entertainment, and design. The motto of TED is "ideas worth spreading," and the website regularly brings together some of the greatest minds of our time. Rather than having

speakers present at length, speakers are given a maximum of 18 minutes to present their ideas in the most innovative and engaging way possible. Presently, there are more than 1,000 talks available to view online free of charge, and since 2006, these talks have been viewed more than 500 million times. These short and powerful presentations are precisely the type of episodic event that can help gifted students to explore their curiosity and to potentially ignite future independent investigations.

Khan Academy (http://www.khanacademy.org) is a collection of more than 2,800 video tutorials covering everything from basic arithmetic to advanced calculus and from biology to U.S. history. Usually lasting no more than 10 minutes each, the videos were recorded by Salman Khan and provide a practical explanation of a single topic. Khan Academy can be used not only for tutorial purposes, but it can also provide opportunities for gifted students to freely explore advanced content at their own pace.

Recognition and Competition

Whereas intrinsic motivation to learn is the educator's ultimate goal, extrinsic motivators can and should also be considered. For example, recognition may be one way to utilize extrinsic motivators with gifted students, as their need for recognition is often undersatisfied in educational settings focused on the success of all students, where group achievement is given credence over individual achievement. Gifted students are more motivated in environments that celebrate achievement and applaud success. Further, the rivalry among siblings often enhances a determination for success (Phillips & Lindsay, 2006). As mentioned previously, it is important that tasks for gifted students be sufficiently challenging because without appropriate challenge in learning tasks, the need for achievement and recognition of that achievement is not satisfied (Lens & Rand, 2000; Malone & Lepper, 1987), which negatively effects motivation.

Although the concept of learning contracts is hardly a new idea in gifted education, technology can be leveraged to create digital learning environments that employ elements of competitive game play and recognition. The website 3D GameLab (http://3dgamelab.org.shivtr.com) is an online learning platform created at Boise State University that allows educators to create quest-based activities. Rather than providing a linear structure of learning, 3D GameLab provides a personalized learning experience in which students are able to earn experience points, ranks, reward, and badges by completing a series of self-selected quests. This type of learning honors choice in activities, allows for self-paced learning, and publicly acknowledges achievement by provide almost instant feedback.

Mozilla's Open Badges Project (http://wiki.mozilla.org/Badges) is a learning platform that is being utilized for the Badges for Learning (http://dmlcompetition.net) competition sponsored by the MacArthur Foundation and HASTAC (Humanities, Arts, Science, and Technology Advanced Collaboratory). This is an open-learning platform that allows anyone to create web-based activities and issue, earn, and then display badges signifying completion of a learning goal or objective. In much the same way that the Boy and Girl Scouts of America have established a culture of recognition for task completion and achievement, the Badges for Learning initiative seeks to create opportunities for individuals to publicly display their skills and accomplishments online.

Motivation and Technology as an Outcome

To reiterate our beginning thought, today's youth do not necessarily view technology as an opportunity but rather as an essential tool for their existence. Because of the access to technology, consider that we are experiencing an era of unprecedented creative productivity. Resnick (2006) suggested that we begin to view the computer more as a paintbrush and less as a technological device. For a moment, think of the digital devices that many of us carry around with us at all times. More than mere phones, these mobile devices can be viewed as Swiss Army knives of creative

productivity. With this one device, you can not only take photographs and record audio or video, but you can edit your creations and instantly share them with the entire world.

There are multiple platforms and services in which to share one's work, and we are living in a culture that is thriving on the idea of sharing experiences. For example, 48 hours of video are uploaded to YouTube every single minute, with more than 3 billion videos being viewed every day. There seems to be an almost insatiable desire to share our experiences with others. In addition to the more than 800 million active Facebook pages, on average, more than 250 million photos are uploaded to Facebook per day, making it the largest collection of photographs that has ever existed. With blogging platforms, we have the power to share our thoughts, ideas, and creations with anyone who is interested in reading them. WordPress and Tumblr blogging services now each host more than 20 million blogs. Each of these services represents potential authentic audiences for the publication and dissemination of creative products. As many have suggested, when students are creating products for audiences beyond the classroom, there is increased engagement in the process, and they are more motivated to produce a quality product.

Future Research

Although much has been said about the inherent motivating qualities of technology, generally, there is a paucity of research that directly reflects the connection between Internet and communication technology use and motivation or satisfaction (Bekele, 2010). In addition to the limited research, there are varying degrees of methodological rigor and sample size (and little mention of effect size), as well as limited use of comparison groups in research relevant to relationships between Internet technologies and motivation. Future research studies may want to consider focusing on parsimonious aspects of motivation and Internet technologies by focusing on particular factors contributing to motivated action while continuing to address specific factors within technology use. Additionally, including comparison groups within the study and incorporating methodological refinements commensurate with studies in other areas of the social sciences may further increase our understanding of the complex relationship of motivation and Internet technology use. Finally, gifted students are vital to the advancement of society. Future studies may want to include gifted students as a discrete population in research on Internet technologies and motivational outcomes.

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