16.

Understanding the Gap

Gender Similarities and Differences in Persistence and Self-Efficacy in a Coding Game

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Abstract

Traditional research on gender differences in learning and motivation yield a rich outline of how self-efficacy, persistence, and learning outcomes differ between boys and girls. These differences are especially prominent in male-dominated STEM (science, technology, engineering, and math) subjects, where girls are less interested and engaged despite negligible differences in actual performance. These gender disparities in interest and motivation are echoed in previous research on game preferences, but are quickly transforming as girls take greater interest in and play more games. This paper investigates affective and behavioral differences between boys and girls when learning to code in a game. Results indicated that girls and boys do not differ in their coding self-efficacy, but girls persist longer and may be more resilient in the face of failure. Our analyses provide implications for how future research may disentangle the interactions between self-efficacy in coding and games, failure, persistence, and gender role beliefs.

Introduction

Recent initiatives to engage students in computer programming are starting earlier in children's schooling than ever before (Office of Science and Technology Policy, 2013). In order to learn programming, young students must persist through often frustrating programming tasks to produce effective code. Historically, girls outperform boys in executive-functioning skills related to task persistence (Kochanska et. al, 2000; Zimmerman & Martinez-Pons, 1990), but motivation research suggests that girls are less interested in and feel less competent in Science, Technology, Engineering, and Math (STEM) subjects (Ceci et al., 2014). Games can serve as a powerful environment for promoting persistence, as failure is an integral part of gaming (Ventura et al., 2013). This paper seeks to explore how, if at all, might late-elementary girls' and boys' self-efficacy, interest, persistence, and behaviors differ in a coding game.

Gender differences in self-efficacy, or self-conceptions of ability (Bandura, 1993), are largely reported in STEM academic fields (Zelden & Pajares, 2000). These trends reveal that women feel less competent in STEM fields than men, and these gender differences in STEM self-efficacy emerge largely when students make a transition to middle or junior high school (VanLeuvan, 2004). Women are less likely to choose math-centric STEM careers (Hackett, 1985), and are more likely to leave science-related fields (Center for Talent & Innovation, 2014). More recent work by the NCES reveals that gender disparities in STEM engagement and self-efficacy persist today, despite a narrowing gap in boys and girls' performance, course taking, and technology use (Cunningham et al., 2015). While the gap in general STEM degree attainment is slowly closing (NCES, 2013), differences are still prominent in engineering fields. Women represent 15% of computer science majors and 18% of engineering majors in 2011 (NCES, 2013), and 21% of the computer-programming workforce (US Bureau of Labor Statistics, 2015). Self-efficacy or confidence has been proposed as a major cause of the general disengagement and attrition of women from science and engineering (Ackerman et al., 2013; Hill et al., 2010; Brainard & Carlin, 1997; Zeldin & Pajares, 2000). Female computer science majors report lower confidence (a related construct to self-efficacy) in using computers than even male non-majors (Beyer et al., 2003), and that gender biases in the field contribute to lower interest and engagement (Cheryan et al., 2009). In sum, there is an overall trend of women persisting less and feeling less competent in STEM fields, especially in computer science and engineering, as they get older. Lower confidence and self-efficacy in their science and engineering abilities seem to lower girls' global persistence in pursuing STEM careers. However, most of this body of research has been conducted on high school and college-aged populations across a variety of STEM subjects. Few studies examine gender differences in coding or computer science self-efficacy at the middle-school transitional age, which is the focus of this paper. A critical question of this study is to determine whether late-elementary girls will report lower levels of self-efficacy in a coding game environment.

Games can be particularly useful for promoting persistence, where previous work indicates that both children and adults find games "addictive" and persist highly in game environments, even when the game is difficult or provides many opportunities to fail, because failure is a ubiquitous part of game play (Ventura et al., 2013; Yee, 2006; Juul, 2013). How might gender differences translate into the domain of digital gaming, a subcomponent of STEM? While boys and girls both play video games, boys are more likely to play for longer periods, identify more as gamers, and play games for different reasons (Bonanno & Kommers, 2005; Lucas & Sherry, 2004; Yee, 2007). Historically, gender biases and sexism in commercial games have negatively impacted girls' motivations to play and identify as gamers (Ogletree & Drake, 2007). However, gender disparities in gaming are shifting as digital natives become younger and play games more frequently. Recent commercial polls indicate that female gamers now make up 48% of game consumers, and that girls are more likely to play casual and mobile games than other game types (Nielsen, 2014). Do disparities in game identification, interest, and engagement still apply when we consider the population of young, late-elementary digital natives in our study? How might their predisposed attitudes towards games interact with their self-efficacy or persistence in a STEM subject like coding?

Gender differences in self-efficacy and interest in both STEM fields and games contrast directly with work in gender and persistence in academic tasks. Task persistence is often discussed as a component of both motivation and self-regulated learning because a critical part of self-regulation is the ability to sustain and regulate attention and effort on a task, even when it is unpleasant or difficult (Zimmerman & Martinez-Pons, 1990; Pintrich & de Groot, 1990; Zhou et al., 2007). This study is particularly interested in the construct of task persistence because coding entails the ability to continue working on solutions even when met with frustration or failure. Work in child development unequivocally demonstrates that girls generally are able to sustain attention, persist, and emotionally regulate better than boys (Kochanska et al., 2000; Zhou et al., 2007). Furthermore, persistence and diligence is highly correlated with academic performance (Pintrich & de Groot, 1990; Zimmerman & Martinez-Pons, 1990). Generally, self-efficacy is a common predictor of persistence because students' self-conceptions of ability may increase their expectations of success (Zimmerman & Martinez-Pons, 1990), thereby increasing their willingness to persist on the task (Schunk, 1991; Multon, Brown, and Lent, 1991). However, there is less known about whether girls demonstrate higher task persistence behaviors in computer programming or in games, given that they may feel less self-efficacious and interested in those domains. From work on gender disparities in engineering careers, it is clear that girls demonstrate lower global persistence in the sense that they do not select and pursue engineering careers as often as boys. It is not clear, however, whether boys and girls' differ in local persistence at coding tasks (task persistence), particularly if the task is in a game environment. However, given that persistence is a critical feature of learning and practicing coding, we hypothesized that persistent behaviors would mediate learning of coding principles.

The purpose of this paper is to identify how gender differences in persistence, self-efficacy, and interest in computer programming and games intersect for late elementary students, and whether these differences mediate how effectively students can learn from a game. Analyzing this first wave of true digital natives will reveal whether or not previous findings on differences in game use, self-efficacy, and persistence in engineering still apply today.

Methods

Thirty-seven fifth grade students (54.1% female) were recruited from an urban charter school after-school program. 89.2% of the students reported no prior coding experience, and all students reported having less than a month's worth of coding experience. All students played a digital game designed to teach basic coding. Each game level involved a problem that required students to guide an agent over obstacles to reach a goal using coding blocks similar to Scratch (Maloney et al., 2010). Levels got progressively more challenging and introduced increasingly more sophisticated coding concepts such as loops, conditionals, and nested functions. Students were randomly selected to play either the Full version of the game (n=18, 55.6% Female) or the Minimal version (n=19, 52.6% Female). The Full Game contained many standard game features such as a narrative, failure feedback, performance metrics, and purely fun "bonus" levels with no academic content, while the Minimal Game omitted these features. However, both games contained identical problems, hints, and gating (students could not move forward until all previous levels were completed). The study's original premise was to explore differences in learning and persistence when students engaged with a more game-like or less game-like coding environment. However, the data presented here bear only on gender differences observed in both versions of the game. Because there were negligible interactions between the game versions and gender, all analyses collapse across conditions. For discussion of condition differences see yan, 2016.

The study consisted of five, 40-minute sessions: a pretest session, two gameplay sessions, a challenge session, and a posttest session. In the pretest session, students took a pretest of coding knowledge, and a baseline global coding self-efficacy measure. In the two gameplay sessions, students played the game individually on iPads. During the challenge session, students were given an impossible coding problem set in the context of the game (the challenge task). The challenge was for students to navigate a spaceship through a grid with obstacles to reach a target location, using only 9 coding blocks – one less than the minimum number of blocks required for the solution. An impossible task, a common task for measuring persistence, was selected so that students' willingness to persist would not be conflated with their ability to actually solve the challenge (Ventura et al., 2013). Students did not indicate that they believed that the task was impossible, only that it was difficult. At the end of the two gameplay and challenge sessions, students reported their local self-efficacy for coding within their respective game environments. In the posttest session, all students were given a post-survey, a coding post-test, and another persistence task where students were asked to generate the best solution to a difficult coding problem by writing their codes on paper (the paper persistence task). Regardless of their solution, students were told that their solution was not the optimal one, and asked if they wanted to try again or do something else.

Global (general coding skills, such as debugging or writing) and local (task-specific) coding self-efficacy measures were constructed on a Likert 7-point scale based on Bandura's Guide for Constructing Self-Efficacy Scales (2006). Game play data was collected using screen recordings and embedded log capture. Only a subset of student gameplay data (n=9 for both groups each) was available due to technical difficulties. For the in-game challenge task, students' persistence was measured by how long they voluntarily spent trying to solve the challenge task before choosing to give up and do something else. The post-survey assessed students' game interest, global self-efficacy for coding in and out of the game environments, interest in future coding tasks, and previous gaming behaviors. The 16-question paper coding posttest assessed students' ability to write, debug, and interpret code, as well as their understanding of coding concepts such as conditionals and nested functions. Persistence on the paper persistence task was measured by how many solutions students generated. Teachers were also asked to provide evaluations of student academic performance (estimate of average grade), dedication to school, and ability to focus on school tasks.

Findings

Due to the small sample in this study, it was difficult to demonstrate statistical evidence for all of the effects we were interested in investigating, especially when considering the subset of log and video data available to analyze game behaviors. Given this, we explore and discuss both significant ($p < .05$) and marginally significant ($p <.10$) findings.

Boys and girls differed in their prior game experiences, but not in their interest in coding or the current game task. Boys reported playing more hours of video games per week than girls ($X^2(1, N = 37) = 11.37$, $p = .045$), and identified more as gamers ($X^2(1, N = 37) = 11.31$, $p = .004$). They did not differ on baseline global coding self-efficacy ($p =.10$) and coding knowledge at pretest ($p = .416$). There were also no significant differences in teacher evaluations of student dedication ($p =.158$) and focus ($p =.142$) between boys and girls. Here, we see mixed evidence for prior work: while the boys in our study played and identified more as gamers, they did not differ from girls in coding interest, prior experience with coding, or in teacher reported measures of self-regulation.

In a repeated measures ANOVA on local self-efficacy, by gender and day (Day 1 and 2 of Gameplay, Challenge Day), girls demonstrated non-significantly different self-efficacy from the boys on most days, but trended towards being more self-efficacious right after a failed challenge ($F(1,34) = 2.53$ p = .094; post-hoc $t(36) = 2.925$, $p = .096$) (see Figure 1).

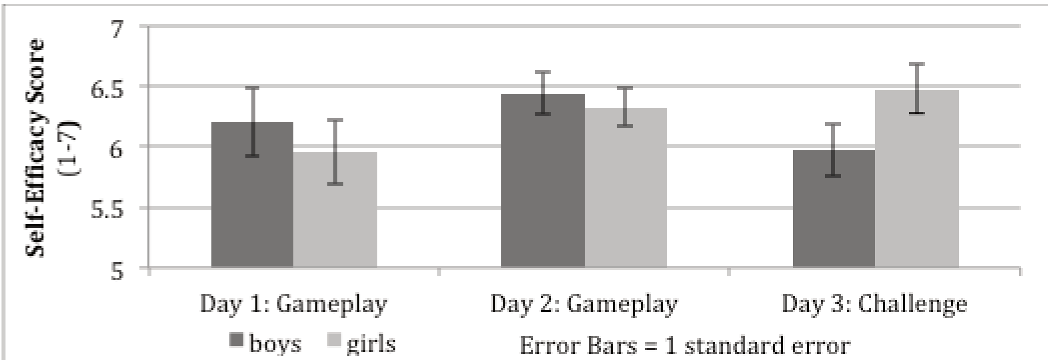

Figure 1. Local self-efficacy by day.

Our trends suggest that while boys' self-efficacy for coding dropped after failure, girls' self-efficacy was unaffected by failure. However, due to low statistical power it would be difficult to confidently conclude that this higher self-efficacy after failure is a true effect. These results also contradict prior work predicting that they would have lower overall coding self-efficacy (Day 1 and 2 of gameplay). Boys and girls did not differ in measures of intrinsic interest in the coding game (p = .16) or in future coding tasks (p = .436) after the study.

For the in-game challenge task, girls persisted longer in generating the target solution than the boys – see Table 1 (t(37) = 3.73, p = .05). Girls also produced more iterations on the paper persistence task that followed the post-test (t(37) = 7.11, p = .01). Thus, girls demonstrated greater persistence at a challenging coding task both within the learning environment (on the game persistence task) and outside (paper persistence task). Either girls generally exhibit more persistent behaviors, or their development of persistence through the game transferred out to other coding tasks. A linear regression revealed that neither self-efficacy coming into the challenge (Day 2 SE) or it's interaction with gender (p = .54) predict persistence on the challenge task (R^2 = .03, F(1, 35) = 1.16, p = .29).

		Boys	Girls
Measure	N	*M (SD)*	*M (SD)*
Challenge Persistence (mins)*	37	19.85 (7.44)	25.96 (11.06)
Paper Persistence (# of codes)*	37	1.41 (.507)	2.15 (1.04)
Day 1 Time On-Task (mins)	18	34.70 (3.47)	35.72 (1.47)
Day 2 Time On-Task (mins)*	18	27.14 (6.61)	33.70 (6.30)
Out-of-Sequence Moves*	18	3.67 (2.00)	1.22 (0.83)
Post-Test (out of 16)	37	8.29 (3.03)	9.05 (2.69)

Note. *p < .05

Table 1. Means and SD of persistence measures and learning outcomes by gender.

A repeated measures ANOVA of time-on-task (time actually spent playing coding levels) by gender and day (1 and 2 of play) demonstrated that while boys and girls did not differ in their time on task on Day 1, girls spent more time on-task than boys did on Day 2 (F(1, 16) = 6.156, p = .03 post-hoc t(16) = 4.65, p = .047). This means boys spent more time on the level selector screen and in bonus levels, and less time actually coding on Day 2, after the novelty effect of the game had worn off. On the other hand, this is further evidence of greater task persistence from girls, where they were more willing to keep coding even when the task became tedious. Boys were also much more likely to go out of the sequence of the game levels (t(16) = 11.456, p = .004) than girls were. However, boys and girls did not differ in the proportion of easy or difficult levels they played (p = .14), or the complexity of codes used (using one or more conditional or loop block in lieu of longer but simpler commands) during the gameplay (p = .61). When analyzing the different kinds of codes students used in levels that required multiple attempts, we saw that boys and girls did not differ in either starting with (p = .12) or ending their solutions with complex codes (p = .86): both boys and girls generally started with more complex codes, and ended with simpler code. In other words, boys and girls equally gave up on employing more complex code in their solutions when they couldn't get it right on the first try.

An ANCOVA on post-test scores by gender, controlling for pre-test scores revealed that both boys and girls learned about coding in the game, but did not differ in their post-test outcomes ($F(1,34) = .515$, $p = .478$). A linear regression of persistence times and gender on post-test scores revealed that persistence on the challenge task is predictive of learning ($R^2 = .24$, F(1, 35)=10.33, p = .002), but gender (p = .33) and its interaction with persistence (p = .32) are not. Given that persistence was associated with greater learning, and girls persisted more in play and in challenge, this finding that girls' persistence did not lead to greater learning is very surprising.

Conclusions and Implications

Despite extensive prior research demonstrating that girls possess lower self-efficacy in STEM domains and engineering in particular, we found no evidence that this was true in our coding task. Boys rated themselves the same as girls in self-efficacy leading up to the challenge task. A possible explanation for the lack of self-efficacy differences before the challenge task is that this particular population of 5^{th} grade students had not yet internalized the gender expectations in coding and engineering that typically diminish girls' self efficacy. Before starting the study, teachers informed us that most students did not even know the meaning of the word "coding." It may also be that this game is more gender-neutral than other games, and that this similarly translated into more equivalent coding self-efficacy. The game is a tablet-based puzzle-style game not unlike other casual mobile games, and recent census of commercial gamers indicate that girls are just as likely to play mobile games as boys are (Nielsen, 2014). These interpretations about diminishing gender biases are supported by Cheryan et al.'s (2009) work that showed how making computer science environments more gender neutral can encourage women's interest and retention. A final possible, optimistic explanation is that the gender gaps found in games and STEM domains like coding are closing. These explanations are supported by our results showing that boys and girls did not differ in their intrinsic interest in the game, the coding task, or future coding tasks.

Boys and girls did, however, did appear to differ in their self-efficacy immediately after the challenge task, where girls rated themselves significantly higher than boys, and insignificantly different from themselves before the challenge task. Given the low statistical power and borderline trends of the statistical test, we tenuously discuss the possibility of this effect, while acknowledging the vulnerability to Type I error. As such, we might conclude that experiencing a failure in a challenging task did not impact girls' self-efficacy, but did significantly lower boys'. One possible explanation is that the effect of failure – their inability to complete the challenge – negatively impacted boys' sense of competency and willingness to persist more than girls. This is supported by earlier research on how important success and failure outcomes are for male conceptions of competency (Eccles, 1987; Hackett, 1985). Conversely, girls' coding self-efficacy was less responsive to failure, presumably because failing the challenge had less of an impact on their self-conceptions of coding ability.

In general, our findings affirmed previous work on how boys and girls approach academic tasks. Girls did persist longer on the challenge task within the game and were more willing to persist on a coding challenge outside the game (the paper persistence task), compared to boys. Additionally, girls were more on-task on Day 2 of gameplay than boys, which suggests that they were more persistent on coding-relevant game levels even when the novelty of the game wore off. From research on gender differences in academic self-regulation, girls being more persistent and self-efficacious in the face of failure compared to boys come as no surprise. These results imply that the pattern of greater persistence for girls is true even in game environments and in a STEM domain like coding.

It is unclear whether higher self-efficacy led to more persistent behaviors. The idea that higher self-efficacy leads to higher persistence is supported by the fact that girls' persistence on the challenge task was coupled by their apparently higher ratings of self-efficacy after challenge. However, there was no predictive relationship between coding self-efficacy at the end of day 2 of play (i.e. prior to challenge) and persistence in the challenge task, and girls did not differ from boys' self-efficacy prior to challenge. Thus, self-efficacy in itself cannot be the primary explanation for girls' persistence behaviors. An explanation proposed earlier was the idea that success and failure may have a greater impact on boys because external outcomes hold greater weight in male self-efficacy (Eccles, 1987). As such, it is possible that being told that they did not successfully complete the challenge may deplete boys' self-efficacy and their willingness to persist if they subscribe to these gendered approaches to success and failure, but not girls'.

Given the relationship found between persistence and learning outcomes in prior studies, we would have expected that girls' greater persistence would have translated into either better coding behaviors during gameplay or greater learning. Previous analyses in this study revealed that the most significant predictor of learning was the percentage of hard levels a student solved with complex code (Malkiewich et al., 2016). However, girls neither learned more nor used more complex code in their solutions, despite the fact that were more willing to persist and stay on-task. A possible explanation for this could come from differences in how boys and girls approached the game environment. In order to learn how to use complex code through the game, students would have to use conditional or loop blocks as part of their code; however, an incorrect use of these blocks resulted in a failed attempt and lowered the final level score even if a correct solution was generated in subsequent attempts. In other words, the game punished players for using complex code incorrectly. Because the girls in this study played games less often, they may have felt more intimidated in game environments compared to their male counterparts and thus hesitate to use the complex code for fear of lowering the final score. Girls are more risk-averse than boys (Jianakoplos, 1998) and may be less likely to try using more complex code if they can still solve the problem with simpler codes. Another potential explanation is that while girls' self-efficacy and persistence may be unaffected by large-scale failure (such as the challenge task), they may still be equally discouraged by micro-failures (such as a failed level attempt) as boys are during gameplay. This is evidenced by the fact that boys and girls did not differ in the kinds of codes they used on problems where they required multiple attempts. If this is true, despite their larger patterns of task persistence, they may feel just as "defeated" as boys do by incorrect attempts using complex codes, resulting in similarly "simple" final coding solutions.

In summation, while the girls and boys in our study had the same interest, self-efficacy, and learning outcomes, they differed in their persistence behaviors, navigation patterns in the game, and their responses to failure both affectively and behaviorally. Results suggest that the gender gap in self-efficacy and performance in STEM learning may be closing, and demonstrate evidence that a coding game can encourage persistence and self-efficacy in coding for girls. However, our conclusions are limited to the features and type exhibited in this particular game, and the late-elementary population of young urban students with low prior knowledge in coding. Our sample size also raises concerns about the interpretability of significance, particularly for claims related to self-efficacy in the face of failure. Further work can investigate whether specific game features may impact persistence behaviors differently for boys and girls, how failures on a micro and macro level can impact self-efficacy and persistence, and if game self-efficacy or risk aversion explains why girls' persistence behaviors in this game environment did not translate into better learning.

References

Ackerman, P. L., Kanfer, R., & Beier, M. E. (2013). Trait complex, cognitive ability, and domain knowledge predictors of baccalaureate success, STEM persistence, and gender differences. *Journal of Educational Psychology*,105(3), 911.

Malkiewich, L., Lee, A., Slater, S., Xing, C., Chase, C. (2016). No Lives Left: How Common Game Features Can Undermine Persistence, Challenge-Seeking, and Learning To Program. *2016 International Conference of the Learning Sciences, Singapore.*

Bandura, A. (2006). Guide for constructing self-efficacy scales. *Self-efficacy beliefs of adolescents*, *5*, 307-337.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist*, 28(2), 117-148.

Bonanno, P., & Kommers, P. A. M. (2005). Gender differences and styles in the use of digital games. Educational Psychology, 25(1), 13-41.

Brainard, S. G., & Carlin, L. (1997, November). A longitudinal study of undergraduate women in engineering and science. In Frontiers in Education Conference, 1997. 27th Annual Conference. Proceedings.1,134-143.

Ceci, S. J., Ginther, D. K., Kahn, S., & Williams, W. M. (2014). Women in Academic Science A Changing Landscape. Psychological Science in the Public Interest, 15(3), 75-141.

Center for Talent and Innovation (2014). Athena 2.0: Accelerating Female Talent in Science, Engineering and Technology. Retrieved November 12, 2015 from Center for Talent and Innovation database.

Cheryan, S., Plaut, V. C., Davies, P. G., & Steele, C. M. (2009). Ambient belonging: how stereotypical cues impact gender participation in computer science. *Journal of Personality and Social psychology*, *97*(6), 1045.

Cunningham, B. C., Hoyer, K. M., & Sparks, D. (2015). Gender Differences in Science, Technology, Engineering, and Mathematics (STEM) Interest, Credits Earned, and NAEP Performance in the 12th Grade NCES 2015 – 075.

Eccles, J. S. (1987). Gender roles and women's achievement-related decisions. *Psychology of Women Quarterly*, 11(2), 135-172.

Hackett, G. (1985). The role of mathematics self-efficacy in the choice of math-related majors of college women and men: A path analysis. *Journal of Counseling Psychology*, 32, 47-56.

Hill, C., Corbett, C., & St Rose, A. (2010). Why so few? Women in Science, Technology, Engineering, and Mathematics. American Association of University Women.

Jianakoplos, N. A., & Bernasek, A. (1998). Are women more risk averse?. *Economic Inquiry*, 36(4), 620.

Juul, J. (2013). The art of failure: An essay on the pain of playing video games. MIT Press.

Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: continuity and change, antecedents, and implications for social development. *Developmental Psychology*, 36(2), 220.

Lucas, K., & Sherry, J. L. (2004). Sex differences in video game play: A communication-based explanation. *Communication Research*, 31(5), 499-523.

Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. Journal of counseling psychology, 38(1), 30.

National Center for Education Statistics. (2013). Digest of Education Statistics 2013. Washington, DC: U.S. Department of Education.

Nielsen. (2014). U.S. Gaming, A 360° View. Retrieved from www.nielsen.com.

Office of Science and Technology Policy. (2013). Women and Girls in Science, Technology, Engineering, and Math (STEM). Retrieved from https://www.whitehouse.gov.

Ogletree, S. M., & Drake, R. (2007). College students' video game participation and perceptions: Gender differences and implications. *Sex Roles*, 56(7-8), 537-542.

Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, 82(1), 33.

Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational Psychologist*, 26(3-4), 207-231.

US Bureau of Labor Statistics. (2015) Employed persons by detailed occupation, sex, race, and Hispanic or Latino ethnicity. Retrieved from http://www.bls.gov/cps/cpsaat11.htm

VanLeuvan, P. (2004). Young women's science/mathematics career goals from seventh grade to high school graduation. *The Journal of Educational Research*,*97*(5), 248-268.

Ventura, M., Shute, V., & Zhao, W. (2013). The relationship between video game use and a performance-based measure of persistence. Computers & Education, 60(1), 52-58.

Yee, N. (2006). Motivations for play in online games. *CyberPsychology & Behavior*, 9(6), 772-775.

Zeldin, A. L., & Pajares, F. (2000). Against the odds: Self-efficacy beliefs of women in mathematical, scientific, and technological careers. *American Educational Research Journal*, 37(1), 215-246.

Zhou, Q., Hofer, C., Eisenberg, N., Reiser, M., Spinrad, T. L., & Fabes, R. A. (2007). The developmental trajectories of attention focusing, attentional and behavioral persistence, and externalizing problems during school-age years. *Developmental Psychology*, 43(2), 369.

Zimmerman, B. J., & Martinez-Pons, M. (1990). Student differences in self-regulated learning: Relating grade, sex, and giftedness to self-efficacy and strategy use. *Journal of Educational Psychology*, 82(1), 51.