Parental Involvement in Children's Gaming and Students School Outcomes

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Abstract
Although the research on parents' involvement in their children's gaming (PMG) should be an important area of research, there is little research compiled in the field. Considering the dramatic growth of students' gaming and its negative influences on their attitudes and behaviors (Gentile, Lynch, & Linder, 2004) and academic performance (Skoric, Teo, & Neo, 2009), PMG should be examined attentively as a way to alleviate the problems caused by gaming (Nikken, & Jansz, 2006). The aim of the study is to explore the effect of PMG on school outcomes of middle school students. Our research team developed a video game and survey instruments on PMG, students' mathematics engagement, and mathematics performance through iterative validation process. The research team collected data from 403 6th, 7th, and 8th grade students in rural schools in Virginia, the United States. As for PMG, this paper included the four types of parenting behaviors of making rules for digital game playing, checking the content of digital games, guiding to choose good digital games, and playing digital games with children. The results showed that although parental involvement in children's gaming did not show significant direct effects on students' mathematics performance, it had a significant effect on mathematics engagement that made a significant effect on mathematics performance. The study findings provide practical baselines for research on parental involvement in students' gaming.

Keywords: computer games, mathematics engagement, mathematics performance, parental involvement

Significance of the Study

The recent unprecedented growth of students' gaming has been a major concern for many teachers and parents. They worry about the influence of games on students' aggressive behaviors and academic performances in school (Anderson & Bushman, 2001). Many empirical studies indicate the negative outcomes of students' excessive gaming confirming the concerns. Gentile, Lynch, and Linder's study (2004) showed that eighth and ninth grade students who played violent games displayed frequent hostility toward teachers, aggressive arguments with teachers, and involvement in physical fights with peers. They also tended to perform poorly in school. Hastings, Karas, Winsler, Way, Madigan, and Tyler (2009) also showed that time spent playing violent games related to aggression and negatively associated with school competence of children. The authors also showed playing educational games was significantly related to positive school outcomes.

Skoric, Teo, and Neo (2009) examined the habits of gaming of elementary school students and its relationship to their academic performance in Singapore. In their study, the authors collected data on (a) amount of time spent playing video games, (b) addiction tendencies (based on Brown's dimensions of video gaming addiction criteria and questions adapted from the Diagnostic and Statistical Manual of Mental Disorders, 4th ed.), (c) engagement tendencies and (d) demographic information. The results showed that the amount of time spent playing video games on weekdays had a significant positive association with English test scores, but not with mathematics and science test scores. However, children who exhibited gaming addictive tendencies displayed significantly low test scores in the three subjects.

Several educational researchers believe that parental involvement in their children's gaming can mediate the relationship between children's gaming and their negative school behavior. Gentile, Lynch, and Linder's research (2004) showed that when parents limited violent video games of 14-year-old students, the students showed fewer fights and arguments, and comparatively high school performance. Some researchers such as Nikken and Jansz (2006) searched for effective mediation strategies by examining the parental involvement methods that parents used to regulate their children's gaming. Through an Internet survey of 536 parent-child pairs, the authors found that three types of parental involvement in children's gaming as restrictive mediation, active mediation, and co-playing. Interestingly, the three types of PSI were similar to the mediation strategies for television watching. Their results also indicated that parental mediation of gaming strongly predicted by the child's age and the parent's gaming behavior. Interestingly, parents applied more restrictive and active mediation when they predicted negative behavioral effects and more often co-played with their children when they expected positive social-emotional effects of gaming.

However, there is not enough research that has examined the effect of parental involvement in children's gaming on their children's academic engagement and performance. In this paper, our research team attempted to examine parental involvement behaviors in children's gaming by considering different types of involving behaviors. One step further, this research explored its relationship with children's engagement and performance in mathematics class.

Methods

Participants

A total of 403 middle-grade students in low-performing, rural schools that are located in southwest Virginia initially participated in this study. After screening non-responses, our team conducted the analyses for 81 sixth graders, 136 seventh graders, and 115 eighth graders. There were 156 males and 144 females, and the average age of the students was 12.31 years old.

Variables

The main endogenous (outcome) variable of the study was the pre-algebraic performance scores of students who were in sixth, seventh, and eighth grades. This study used an instrument to measure students' mathematics performance, particularly students' fraction proficiency. The mathematics performance instrument contained multiple choice questions to identify students' knowledge of understanding equivalent fractions, multiplying, dividing, and comparing fractions. The math achievement instrument contained a total of 15 questions and showed defensible reliability statistics having α value of 0.849.

To measure students' engagement levels, this study used a mathematical engagement instrument that was composed of 33 items to measure the overall math engagement with three sub-domains of engagement: behavioral, emotional, and cognitive engagement. The researchers created the items based on comprehensive literature review on existing mathematical engagement instruments. The four Likert-type scales indicated 4 for strongly disagree and 1 for strongly agree. The coefficient alpha for overall engagement was 0.89; behavioral engagement was 0.68; emotional engagement was 0.84 and; cognitive engagement was 0.79. The reliability test results at the posttest demonstrated higher internal consistency than at the pretest: overall engagement was 0.91; behavioral engagement was 0.79; emotional engagement was 0.86 and; cognitive engagement was 0.81.

The main predictor variables of the study were four types of parental involvements (PI) on their children's gaming behavior: 1) "My parents make rules on my digital game playing."; 2) "My parents check the content of my digital games."; 3) "My parents tell me which digital games are good ones."; and 4) "My parents play digital games with me." The variables were named as "Rule," "Check," "Choose," and "Play" and assigned 1 for "strongly disagree," 2 for "somewhat disagree," 3 for "somewhat agree," and 4 for "strongly agree." This study included students' gender (male = 0; female = 1) and age as covariates in an analytical model to consider the effects in the analysis.

Analysis

This research used a path model making paths students' age and gender, PI, mathematics engagement, and mathematics performance as observed variables. The study used LISREL that is the well-known software for its multiple strengths, such as dealing with non-recursive models, multi-group comparisons with a group mean centering, and tests of constraints.

Results

Preliminary Analysis

As preliminary analyses, this research first conducted descriptive statistics analyses to examine the levels of parental involvements in their children's computer games and bivariate correlations of parental involvement with the main outcome variables. To summarize the frequencies of PI on their children's gaming, more than 40 percent (from 40.3% to 50.3%) of parents in our study did not take any action and less than 18 percent (from 10.7% to 17.3%) of parents displayed active involvement for as shown in Table 1.

Table 1. Frequencies and percentages of parental involvement for children's gaming

	Strongly Disagree	Somewhat Disagree	Somewhat Agree	Strongly Agree
My parents make rules on my digital game playing.	151 (50.3%)	69 (23.0%)	48 (16.0 %)	32 (10.7%)
My parents check the content of my digital games.	119 (40.3%)	59 (20.0%)	66 (22.4%)	51 (17.3%)
My parents tell me which digital games are good ones.	124 (42.0%)	41 (13.9%)	81 (27.5%)	49 (16.6%)
My parents play digital games with me.	124 (41.5%)	56 (23.4%)	70 (23.4%)	49 (16.4%)

The correlation analysis revealed that PI had a significant negative correlation with students' age (r = -.159, $p < 0.01$) indicating that parents involved more frequently in students' gaming for younger students than older students. PI also showed a significant positive correlation with mathematics engagement (r = .224, $p < 0.01$), indicating that more frequent parental involvement was associated with students' high mathematics engagement. PI did not show significant relationships with students' gender and mathematics performance. Mathematics engagement had a significant relationship with mathematics performance ((r = .165, $p < 0.01$).

Table 2. Correlation among variables

	1.	2.	3.	4.	5.
1. age	1				
2. gender	-.033	1			
3. PI	-.159**	-.061	1		
4. Math Engagement	-.152*	.043	.224**	1	
5. Math Performance	-.420**	.066	.002	.165**	1

Note: * indicates significant at 0.05 and ** indicates significant at 0.01

Path Analysis

The path analysis results indicated a good fit of the model to the data, $\chi 2 = 1.50$, df = 2, NFI = .984, RMSEA = .000). The incremental fit indices of .90 or above, and an RMSEA value of .07 or less are considered adequate, suggesting that the fit of our model to the data was acceptable (Browne & Cudeck, 1993). Figure 1 lists the significant path coefficients. As expected, student's age had a significant and negative direct effect on all three outcome variables of PI ($\beta = -.16$, $p < .01$), mathematics engagement ($\beta = -.12$, $p < .05$), and mathematics performance ($\beta = -.42$, $p < .01$), indicating that younger students tended to have high levels of PI, mathematics engagement, and mathematics performance. However, gender did not show any significant coefficients.

Consistent with the correlation results, parental involvement produced a significant coefficient for mathematics engagement ($\beta = .21$, $p < .01$), indicating that when parents showed high involvement for their children's gaming behavior the students tended to show high mathematics engagement. However, parental involvement did not reveal a significant coefficient for mathematics performance. Importantly, students' mathematics engagement produced a significant coefficient for mathematics performance (($\beta = .12$, $p < .05$).

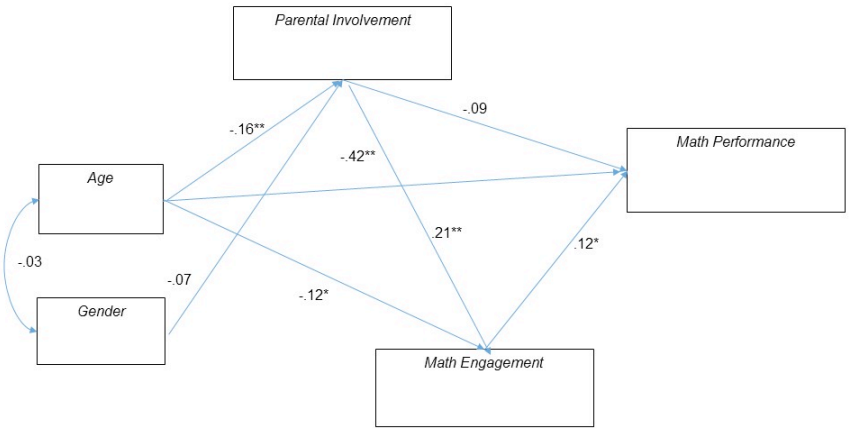

Figure 1. Path diagram for variables and coefficients of paths

Summary and Conclusion

In this study, this research examined the effects of parental involvement in their children's gaming behavior in attempt to suggest a way to reach a best technology use for both parents and students as suggested by Lewin and Luckin (2010). If parents actively get involved in their children's gaming by suggesting good games and playing those games with children, the parents can promote children's academic engagement and performance. As Eow, Wan, Mahmud, and Baki (2009) mentioned, the growth of computer games is inevitable in children's lives, the parents should make an effort to get actively involved in their children's gaming behavior. Parents

can make rules for their children's digital game playing, check the content of children's digital games, decide which digital games are good ones with their children and play digital games with children.

This study shared the same notion in attempt to guide students' gaming behavior and examined the effects of parental involvement in students' gaming on students' mathematics engagement and performance. The results showed that although parental involvement in children's gaming did not show significant direct effects on students' mathematics performance, it had a significant effect on mathematics engagement that made a significant effect on mathematics performance.

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