SPRING 2017 GIASR REPORT: ELI PUETT:

*Effect of a digital educational game on youth science and substance abuse prevention knowledge and attitudes*

The use of technology in K-12 education, especially when used as an educational support or resource, has demonstrated at least small to moderate positive effects on student learning. In a meta-analysis, the use of technology in the classroom seemed to facilitate content knowledge and positive attitudes, particularly when embedded tasks are challenging to the student (Lee, Waxman, Wu, Michko, & Lin, 2011). Both teachers and students in one study perceived technology-supported learning using computers and laptops as motivating and interesting (Godzicki, Godzicki, Krofel, & Michaels, 2013). Laptop and tablet computers have recently become popular devices in primary and secondary schools.

Science instruction has used digital educational games to support inquiry, problem-solving, and knowledge acquisition. In one review, improvements in academic achievement in science as well as overall learning development were noted (Zheng, Warschauer, Lin, & Chang, 2016). In another review, however, most games were focused on student learning of scientific concepts (Li & Tsai, 2013). For elementary science students, technology applications in addition to other instructional methods showed promise as an effective teaching strategy (Slavin, Lake, Hanley, & Thurston, 2014). Technology and internet access appeared to improve interest and motivation for science among at-risk students (Gillard, 2010).

Health education instruction has also used digital educational games for health promotion. In an analysis, the games, with broad appeal to all ages and genders, demonstrated minor effects on knowledge and health risks (DeSmet et al., 2014). For example, in one study, a digital educational game with strong learning content was developed for elementary health students. Student motivation and knowledge improved as compared to control (Sung, Hwang, & Yen, 2015). Specifically for the health content area of substance abuse for adolescents, a review suggested that the games can improve student substance abuse knowledge but with limited effect on attitudes (Rodriquez, Teeson, & Newton, 2014).

Because science and health education have had some success in using technology and digital educational games for learning, and students in a rural county were at high risk for substance abuse problems; the BrainTrain4Kids digital educational game was implemented in the county school district’s afterschool program for at-risk youth for over 100 students in grades 3-5. Delivered as a 6-week program (one day each week for an hour) during the regularly-scheduled drug prevention session of the afterschool program, BrainTrain4Kids covered the risks associated with substance use and how to stay drug-free.

Therefore, the purpose of this study was to determine if the game improved participants’ knowledge of science and drugs, and if the game improved participants’ attributes toward science and drugs.

As part of the curricular package, the 21-question, paper-pencil BrainTrain4Kids Knowledge Assessment Instrument was used to measure participants’ pre-post program science and drug prevention content knowledge. Also as part of the curricular package, the 29-item, paper-pencil BrainTrain4Kids Attitude Assessment Instrument was used to measure participants’ pre-post program attitude toward science and drug prevention (National Registry of Evidence-based Programs, n.d.). Both contained Likert-style and true-false questions aligned with the specific content covered in each of the six train stations.

After Institutional Review Board approval, principal/agency and parent/guardian consent, and participant assent; participants completed the confidential pre-assessments one week before program start during the regularly-scheduled, weekly drug prevention session of the afterschool program. The also completed the confidential post-assessments one week after the program ended.

Two paired sample t-tests were run on both the knowledge and attitude sections of the pre- and post-surveys. The paired sample t-test for the knowledge scores showed no statistical significance (t(41)= 0.20, p=0.85). Pre-knowledge had a mean of 8.62 and a standard deviation of 3.40. The post-knowledge scores had a mean of 8.50 and a standard deviation of 4.49.

The paired sample t-test for attitudes also resulted in being statistically insignificant (t(23)=-0.16, p=0.87). The pre-attitude scores had a mean of 63.63 and a standard deviation of 3.40. The post-attitude scores resulted in a mean of 63.83 and a standard deviation of 6.73. The reason for the lower number of matched sets in the attitudes pre/post is because several students indicated they did not understand one or more of the attitudes items.  These responses were treated as missing data and thus, did not allow for a total attitudes score to be computed.

Despite the intervention resulting in a statistical insignificance, there have been several changes exhibited in the children’s behavior. The main example of this is how they have started to ask more science-related questions to the after school program employees. Also, it is likely that the pre- and post-test might have been too difficult for the age group that it was administered to. The test was administered children from the ages of 8 to 12, and several of the after-school program employees took this test and found it challenging to complete.

Thank you to the OSR for providing me the opportunity to study and evaluate an important educational program for at-risk youth in our community-

Eli Puett

Supporting pictures and photo: Next two pages





