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Video Games in Music Education:
The Impact of Video Games on Rhythmic Performance

By

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Abstract

Little research exists on the use of video games as instructional tools in music education. The purpose of this pilot study was to examine the effects of two different video games on rhythm performance and to determine whether the level of flow achieved during the games had an impact on the results. Collegiate music students (N = 8) participated in an experiment comparing the effects of a traditional video game and a virtual reality video game. While I did not find any statistically significant changes, results imply some practical significance. While educators may wish to implement video games as tools to help improve student rhythm performance, further research should be conducted for more conclusive results.

Keywords: video games, music education, flow, virtual reality, rhythmic achievement

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Video games have become a driving force in the entertainment market. In the last thirteen years, consumer spending on video games grew from $6.9 billion in 2005 (2006 Essential Facts, 2006) to over $35 billion in 2018 (2019 Essential Facts, 2019). By comparison, the domestic film box office grossed under $12 billion in 2018 (Brevet, 2019). According to a report from the Entertainment Software Association (2019), over 164 million adults in the U.S. played video games, with 21% of those players being under the age of 18. With video games having such a large stake in the entertainment market, it is no wonder that educators have looked towards this medium as a tool for education.

Video Games in Education

Researchers in the U.S. discussed the educational potential of video games as early as the late 1970s. Ball (1978) hypothesized that playing video games might provide several benefits to learners, such as improved attention spans, comprehension, and spatial reasoning, as well as help in learning of numerical concepts and transferring learned behaviors to the real world. Over the next decade, researchers studied the potential effects of video games on children and adults, indicating that participants who played video games had greater spatial abilities, reflexes, and responses than their non-gaming peers (Dorval & Pépin, 1986; Lowery & Knirk, 1982).

In the 1990s, game developers began publishing serious games, or "game[s] in which education (in its various forms) is the primary goal, rather than entertainment" (Michael, 2006, p. 17). While some serious games publishers saw success (Annetta, 2008; Prensky, 2001), educators did not embrace these games as expected (Michael, 2006). Instead, teachers and researchers found success in the educational merits of commercial games over time. Gee (2003) described various ways to implement commercial games in the classroom, such as using the strategy game *Age of Mythology* to help make connections to content knowledge in a mythology class. Other educators, especially college professors, have used simulation games such as *Wall Street Trader*, *Start-Up*, and *Airport Tycoon* to teach business planning and management (Michael, 2006).

Video Games in Music Education

While research on video games in education is ongoing, research examining the use of video games in music education is in its early stages (Tobias & O'Leary, 2017). Peppler, Downton, Lindsay, and Hay (2011) tested the effects of the rhythm action game *Rock Band* on children's musical skills and interests. Twenty-four children played the game for over nine months, and researchers found a positive correlation between extended play in the game and assessment results in rhythm transcription, rhythm echoing, and sight-reading. In another study, Paney (2015) discussed how playing singing video games might lead to improved pitch-matching abilities. Gower & McDowall's (2012) participants, aged 9-11, believed that playing music games helped them develop or improve musical competencies such as rhythmic skills.

Virtual Reality

Virtual reality, or VR, is "a technology by which computer-aided stimuli create the immersive illusion of being somewhere else" (Rubin, 2018). While VR has existed as a concept since the 1930s (Curcio, Dipace, & Norlund, 2016), VR did not appear in practice as we now know it until the 2012 Electronic Entertainment Expo, an annual video game trade show (Rubin, 2008). The prototype helmet, later known as the Oculus Rift, was a simple headset that consisted of a strap attached to a small box containing a set of lenses that produced a double image in front of the wearer. The double-image merged in the wearer's perspective when people wore the headset, creating the illusion that the player was in the video game *Doom*. The Oculus Rift released in 2016 along with the HTC Vive and the PlayStation VR systems (Rubin, 2008).

While VR games and apps exist for educational use, it seems as if there are no games designed to assist instruction in music. Crucio, Dipace, and Norlund (2016) discussed how educational researchers in VR have primarily focused on the sciences. Games and applications exist for several sciences, such as Desktop VR Earth Motion Systems for astronomy, VR-Engage for geography, and Dr. Friction for physics. Some games exist for social studies and history as well, but seemingly nothing in the arts or music.

Flow Theory in Gaming

While teachers have used video games as instructional tools, researchers have discussed other uses of the medium, such as their ability to help induce flow (Person, Outram, & Minamizawa, 2018). Csikszentmihalyi (1990) defined flow as "the state in which people are so involved in an activity that nothing else seems to matter" (p. 4). When in flow, a person is fully immersed in an activity and experiences high levels of concentration, involvement, and enjoyment. Eight components comprise this theory: "a challenging component that requires skill," "clear goals and feedback," "the merging of action and awareness," "concentration on the task at hand," "the paradox of control," "the loss of self-consciousness," "the transformation of time," and, "the autotelic experience" (p. 49-67).

Gee (2003) suggested that “good” video games contain 36 learning principles, and Shultz (2008) connected four of the principles to flow. “The achievement principle” (Gee, 2003, p. 208) states that there are intrinsic rewards for players of all skill levels. “The practice principle” (p. 208) discusses the amount of time players spend practicing in an environment that is not boring. In “the ongoing learning principle” (p. 209), players learn and unlearn skills to the point of automatization in a cycle, and “the regime of competence principle” (p. 209) explains how players get the time needed to work just at the edge of their abilities so that the game is challenging but not impossible. Rigby and Ryan (2011) connected video games to flow and discussed how video games create a need for autonomy, competence, immersion, and presence.

While examining flow in video games, some researchers looked to measure it. Cowley, Charles, Black, and Hickey (2008) created their measure for flow known as the user-system-experience, or USE, model. Other researchers later critiqued and expanded upon this measure, noting that using existing flow measures not directly related to gaming was just as effective as the USE model (Wiebe, Lamb, Hardy, & Sharek, 2013). Kamali, Arslan, & Çağiltay (2014) found that their participants perceived themselves as being in the flow state while gaming, but the participants based their perceptions off a description of flow provided by the researchers and did not use a validated measure. Some researchers have hypothesized that VR may provide even more potential for flow while gaming (Person et al., 2018), but little research exists on this possible relationship.

The purpose of this pilot study is to examine the effects of two video games (one traditional and one VR) on beat competency and rhythmic imitation among collegiate music students and to determine whether the level of flow during the gaming experience has an impact on the results between groups. The questions that guided this pilot study were:

1. What is the difference in beat synchronization between students who played a traditional video game and a VR game?
2. What is the difference in rhythmic pattern imitation between students who played a traditional video game and a VR game?
3. What is the relationship between rhythmic achievement and perceptions of flow state?

Method

Participants

Participants ($N = 8$) were music students enrolled at a university in the southern United States. The sample included men ($n = 5$) and women ($n = 3$) between the ages of 19-22. Each participant reported studying music for eight or more years. I recruited participants via emails to studio professors, posts on a private departmental Facebook page for faculty and students, and a live demonstration of the games in the lobby of the university's music building. The participants were a sample of convenience.

Research Design and Procedures

The pilot study was an experimental design. Participants took a pre- and post-test measure of rhythmic achievement and beat competency using Flohr's Rhythm Performance Test-Revised (2004). I divided them into two groups based on pre-test scores. Each group had similar score means. One group played a traditional video game (*Guitar Hero: World Tour*) while the other played a VR game (*Beat Saber*) twice a week over four weeks for approximately 20 minutes. After the first, fourth, and eighth gaming sessions, each participant completed the Short Flow State Scale-2 (Jackson, Ecklund, & Martin, 2008). I recorded scores and difficulty levels from the games for each participant during each gaming session. After the four-week period, participants took a post-test to measure any change in rhythmic achievement. I compared pre and post-test scores between the two groups to determine if any statistically significant differences existed, and I measured final flow scores against post-test scores to determine any relationships.

Pre/Post Test

I measured rhythmic achievement and beat competency using the Rhythm Performance Test-Revised (RPT-R), developed by Flohr (2004). Flohr developed the RPT-R for children aged

4-12 with test-retest reliability reported as r = .90, but Flohr and Meeuwsen (2001) also used it with college-aged students. Based on the research comparing synchronization rates among non-musicians, musicians, and percussionists, the researchers concluded that the RPT-R was valid for adults as well as children (Flohr & Meeuwsen, 2001). The researchers measured criterion validity by comparing correct answers on the Primary Measure of Music Audiation Rhythm Subtest with percentage scores from the RPT-R. Part one of the RPT-R had a moderate correlation of r = .25 (as was expected), and part two had a significant correlation of r = .45 (Flohr, 2004).

Participants completed the RPT-R on a Windows-based laptop and wore headphones for greater audio accuracy. The test consisted of two portions: a beat synchronization test and a rhythm pattern imitation test (Flohr, 2004). In the beat synchronization test, participants tapped the space bar in time with a song that repeated five times, increasing the tempo with each repetition until it was over. The rhythm pattern imitation test consisted of twenty rhythms that participants echoed by tapping the spacebar, starting with simple rhythms and increasing in complexity as the test progressed. If a participant scored less than 50% on any pattern from numbers 6-15 the test ended.

Flow Scale

Participants took the Short Flow State Scale-2 (SFSS-2) developed by Jackson, Ecklund, and Martin (2008) after their first, fourth, and eighth play sessions. Participants answered the nine items on the SFSS-2 on a Likert-type scale with responses ranging from 1 (strongly disagree) to 5 (strongly agree). Each item corresponded to Czikszentmihalyi's (1990) domains of flow (Jackson et al., 2010, pp. 7-10). Confirmatory factor analysis (CFA) yielded a load range of

.13-.69 across the domains. CFA of the item-identification drawn from the LONG scales showed that the SHORT scale yielded reliability results of .77 (Jackson et al., 2008).

Treatment

One group played *Guitar Hero: World Tour* on the Microsoft XBox 360 while the other group played *Beat Saber* on the Sony PlayStation VR. Participants selected songs they wanted to play and the difficulty setting in their assigned game. Each game scored participant performances using proprietary methods programmed into the games and provided immediate feedback in real-time for each note hit or missed.

In *Guitar Hero*, participants used a guitar-shaped MIDI controller to match notes coming down the screen on a path. Participants played the game on a large-screen, high-definition television using its built-in speakers for audio.

In *Beat Saber*, participants wore a virtual reality headset and used handheld motion controllers in each hand. The controllers appeared as swords in the game environment that participants used to hit blocks coming towards them on a path. The game also tasked participants with dodging walls during portions of some songs, as well as avoiding what the game refers to as "bombs" that appear as mines in-game. Participants listened to audio via over-ear headphones plugged into the VR headset. A television screen replicated the participants' view so I could observe their gameplay.

Analysis

I used IBM's Statistical Package for the Social Sciences (SPSS) to run different statistical analyses in order to answer each research question. Questions one and two focused on the differences in beat synchronization and rhythmic pattern imitation between the participants who played *Guitar Hero* and the ones that played *Beat Saber*. For both questions, I performed a paired-samples t-test to determine if any differences existed. I also calculated Hedge's *g* in order to determine the effect size of these results.

Question three focused on the relationship between perceptions of flow and overall rhythmic achievement. In order to determine if any relationship existed between these two variables, I performed a Pearson product-moment correlation between each group's final flow surveys and post-test scores.

Results

My results are presented based on the statistical analyses used. The first section details the results of the first two research questions and extra data for the calculated effect size. The second section details the result of the third research question.

Differences in Beat Synchronization and Rhythm Pattern Imitation

Participants took the RPT-R twice: once as a pre-test before the experimental period and once as a post-test after the treatment. I gathered pre and post-test scores for each part of the test to help determine differences. Both groups saw improvement from pre-test to post-test (see Table 1).

To determine if any significant differences existed between pre- and post-test RPT-R score means for each group ($N = 8$, $n = 4$), I used a paired-samples t-test. To avoid any possible Type I errors, I employed a Bonferroni adjustment to lower alpha to .025 (.05 ÷ 2 comparisons) for each t-test. No significant difference in beat synchronization existed between participants who played *Beat Saber* ($t = -2.40$, $df = 3$, $p = .096$) or *Guitar Hero* ($t = -2.72$, $df = 3$, $p = .072$) (see Table 2). I also found no significant difference in rhythm pattern imitation between the *Beat Saber* group ($t = -3.87$, $df = 3$, $p = .030$) or the *Guitar Hero* group ($t = -2.14$, $df = 3$, $p = .122$) (see Table 3). In order to see if any practical significances existed, I computed Hedge's *g* using the t-test results. I found effect sizes of $g = 1.26$ for beat synchronization in *Beat Saber*, $g = 2.49$ for beat synchronization in *Guitar Hero*, $g = 3.87$ for rhythm pattern imitation in *Beat Saber*, and $g = 2.78$ for rhythm pattern imitation in *Guitar Hero*, suggesting strong practical significance for all results (see Tables 2 and 3).

Relationship between Flow and Rhythmic Achievement

In order to determine any relationship between flow and rhythmic achievement, I conducted a Pearson product-moment correlation (see Table 4) using each group's post-test RPT-R scores (*Beat Saber* $M = 82.5$, $SD = 9.54$; *Guitar Hero* $M = 83.0$, $SD = 4.24$) and final SFSS-2 scores (*Beat Saber* $M = 4.88$, $SD = 0.13$; *Guitar Hero* $M = 4.65$, $SD = 0.57$). I found a moderate indirect relationship ($r = -.680$; see Table 5) in the group that played *Beat Saber*, as well as a weak but direct relationship ($r = .097$; see Table 6) in the group that played *Guitar Hero*, but these were not significant ($p < .05$).

Discussion

For the first two research questions dealing with beat synchronization and rhythm pattern imitation, I found that no statistically significant differences existed between either group in my experiment. This suggests that, while playing a rhythm-based video game may lead to an increase in rhythmic achievement, there is likely no difference between playing a traditional video game versus playing a video game in VR. However, I should note that one might find statistical significance among a larger group of participants.

Each game provided a different result for the third research question regarding the relationship between flow and rhythmic achievement. Participants who played *Guitar Hero*, a traditional video game, showed a more direct relationship between the two variables than those who played *Beat Saber*, a game in VR. However, the relationship was stronger among the participants who played *Beat Saber* than those who played *Guitar Hero*.

My results seem to support previous findings that playing certain video games may lead to an increase in musical skills (Paney, 2015; Peppler et al., 2011). Like Peppler et al. (2011), repeatedly playing a rhythm-based music video game over time may lead participants to increased rhythm performance. Educators may wish to look to these games as a tool to help students improve their rhythm skills.

Limitations

It is possible that, if one replicates this study, a larger group of participants may lead to statistically significant results. When calculating for Hedge's *g*, I found strong practical significance in both categories for each group. Having more participants would provide more data points, potentially leading to more varied individual results.

It is also possible that the measure used to determine student flow states, the Short Flow State Scale-2, was not a proper measure for this study. With only nine survey items and eight participants, a wide array of varied data did not surface. Results may have been stronger with the 36-item long-form survey. Results may be even stronger with the long-form survey and more participants.

I should also note that all participants were active music majors with eight or more years of musical experience. Student musical experience may have led to similar results between students in the RPT-R. Any growth between the pre-test and post-test may also have been attributed to any music classes students were actively participating in. In future studies, recruiting younger students with much less musical experience may lead to stronger results.

Implications

Further research in the use of video games in music education is needed. However, due to my results and the results of previous studies, I believe that video games may be a worthwhile tool in the music classroom. These games should not replace traditional music education, of course, but merely supplemented to help improve rhythmic skills. Playing these games with younger students may lead to their success early on and follow them should they continue musical curriculum.

While educators may wish to find a way to incorporate these games into their instruction, I wish to offer another way to frame this study. In 1923, then-president of the Music Supervisors National Conference – now known as the National Association for Music Education, NAfME – first spoke the phrase, “music for every child, every child for music” (Heidingsfelder, 2014). This phrase quickly became the organization’s slogan for the next several decades.

While "music for all" may be the slogan, one does not see it in action. In a study meant to determine the effect of No Child Left Behind on student participation in secondary music programs, Elpus (2014) found that enrollment rates from 1982-2009 maintained roughly at 34%. In a demographics survey, Elpus and Abril (2011) found an overrepresentation of white students, as well as students from higher socioeconomic statuses in high school seniors, enrolled in music programs. Students of color (particularly African American students) and students in lower SES classifications were underrepresented. These numbers tell us that there is a clear gap in the demographics of students participating in music courses, largely due to low SES that disproportionately affects students of color.

In order to reach more students, educators have implemented technology-based music classes, or TBMCs, at the middle and high school levels (Dammers, 2012). In his study, Dammers found that out of 528 high schools across the United States, 14% indicated that they offered TBMCs. Sixty-nine percent of students enrolled in these classes did not participate in a traditional music course, and 20% of the schools that offered TBMCs had a student population between 81-100% that had free or reduced lunch. These TBCMs seem to be reaching students from low-income families. If more music educators could implement them across the United States, we may see an increase in student participation in music courses.

According to Dammers' report, students who are not currently involved in other music courses are ready to enroll in technology-based music classes. While offering video games in place of traditional music course offerings is a bit extreme, using them as practice tools could help students improve their rhythm skills, and maybe even draw in more students. If schools were to diversify their music course offerings to include music technology courses, it is possible that they could see an increase in music program enrollment as well.

Conclusion

Playing music-based video games, particularly virtual reality, may lead to improved rhythm performance. Further research, especially replication using more participants, is needed. One might also research the impact of technology-based music classes, especially in low-income areas. Research on student opinions in music class offerings may prove fruitful as well. Schools and music educators must expand their course offerings to meet student interests and needs to increase student enrollment in music courses.

References

2006 essential facts about the computer and video game industry. (2006). Retrieved from https://library. princeton.edu/sites/default/files/2006.pdf

2019 essential facts about the computer and video game industry. (2019). Retrieved from theesa.com/ wp-content/uploads/2019/05/ESA_Essential_facts_2019_final.pdf

Annetta, L. A. (2008). Video games in education: Why they should be used and how they are being used. *Theory into Practice, 47*(3), 229-39. doi:10.1080/00405840802153940

Ball, H. G. (1978). Telegames teach more than you think. *Audiovisual Instruction, 23*(5), 24-26.

Brevet, B. (2019). A look back at 2018's record year at the domestic box office. Retrieved from https://www.boxofficemojo.com/article/ed2573272068/

Cowley, B., Charles, D., Black, M., & Hickey, R. (2008). Toward an understanding of flow in video games. *ACM Computers in Entertainment, 6*(2), 1-27. doi:10.1145/1371216. 1371223

Csikszentmihalyi, M. (2008). *Flow: The psychology of optimal experience*. New York, NY: Harper Perennial.

Curcio, I. D. D., Dipace, A., & Norlund, A. (2016). Virtual realities and education. *Research on Education and Media, 8*(2). doi:10.1515/rem-2016-0019

Dammers, R. J. (2012). Technology-based music classes in high schools in the United States. *Bulletin for the Council of Research in Music Education*, 194, 73-90. doi: 10.5406/bulcouresmusedu.194.0073

Dorval, M., & Pepin, M. (1986). Effects of playing a video game on a measure of spatial visualization. *Perceptual Motor Skills, 62*(1), 159-162. doi:10.2466/pms.1986.62.1.159

Elpus, K. (2014). Evaluating the effect of No Child Left Behind on U.S. music course enrollments. *Journal of Research in Music Education, 62*(3), 215-233. doi:10.1177/0022429414530759

Elpus, K., & Abril, C. R. (2011). High school music ensemble students in the United States: A demographic profile. *Journal of Research in Music Education, 59*(2), 128-145. doi:10.1177/0022429411405207

Flohr, J. W. (2004). Rhythm performance test-revised. Champaign, IL: Electronic Courseware Systems.

Flohr, J. W., & Meeuwsen, H. J. (2001). Validity of rhythm timing software with college age adults. *Technological Directions in Music Learning.*

Gower, L. & McDowall, J. (2012) Interactive music video games and children's musical development. *British Journal of Music Education, 29*(1), 91-105. doi:10.1017/ S0265051711000398

Heidingsfelder, L. (2014). The slogan of the century: "Music for every child; every child for music." *Music Educators Journal, 100*(4), 47-51. doi:10.1177/0027432114528716

Jackson, S. A., Martin, A. J., & Ecklund, R. C. (2008). Long and short measures of flow: The construct validity of the FSS-2, DFS-2, and new brief counterparts. *Journal of Sport and Exercise Psychology, 30*(5), 561-587. doi:10.1123/jsep.30.5.561

Kamali, T., Arslan, O, & Çağiltay, K. (2014, July). Investigating game player's flow experiences: The case of first time Guitar Hero players. Paper presented at Edmedia 2014, Tampere, Finland. Retrieved from researchgate.net

Lowery, B. R., & Knirk, F. G. (1982). Micro-computer video games and spatial visualization acquisition. *Journal of Educational Technology Systems, 11*(2), 155–166. doi:10.2190/3PAN-CHJM-RT0L-W6AC

Michael, D. (2006). Serious games: Games that educate, train and inform. Boston, MA: Course PTR. Retrieved from https://search.ebscohost.com/login.aspx?direct=true&db=nlebk& AN=14485 8&site=eds-live&scope=site

Paney, A. S. (2015) Singing video games may help improve pitch-matching accuracy. *Music Education Research, 17*(1), 48-56. doi:10.1080/14613808.2014.969218

Peppler, K. A., Downton, M. P., Lindsay, E., & Hay, K. (2011) The nirvana effect: Tapping video games to mediate music learning and interest. *International Journal of Learning and Media, 3*(1), 41-59. doi:10.1162/IJLM

Person, T., Outram, B., & Minamizawa, K. (2018, December). Flow zone: A cross-modal music creation VR experience to induce flow. Paper presented at SIGGRAPH Asia 2018 Virtual & Augmented Reality, Tokyo, Japan. doi:10.1145/3275495.3275507

Prensky, Marc. (2001) *Digital game-based learning*. St. Paul, MN: Paragon House.

Rigby, S. & Ryan, R. M. (2011*). Glued to games: How video games draw us in and hold us spellbound*. Santa Barbara, CA: Praeger.

Rubin, P. (2018) The Wired guide to virtual reality. Retrieved from https://www.wired.com/ story/wired-guide-to-virtual-reality/

Shultz, P. (2008). Music theory in music games. In K. Collins (Ed.), *From Pac-Man to Pop Music: Interactive Audio in Games and New Media* (177-188). Aldershot, Hampshire, England: Routledge. Retrieved from https://search.ebscohost.com/login.aspx?direct= true&db=nlebk&AN =390034&site=eds-live&scope=site

Tobias, E S., & O'Leary, J. (2017) Video games. In A. King, E, Himonides, & S. A. Ruthmann (Eds.), *The Routledge Companion to Music, Technology, and Education* (263-72). New York, NY: Routledge.

Wiebe, E., Lamb, A., Hardy, M., & Sharek, D. (2013). Measuring engagement in video game-based environments: Investigation of the User Engagement Scale. *Computers in Human Behavior*, 32, 123-132. doi:10.1016/j.chb.2013.12.001

Table 1

Rhythm Performance Test-Revised Pre-Test/Post-Test Scores

Group	Test	Mean	N	Std. Deviation	Std. Error Mean
Beat Saber	Beat Synchronization (Pre)	92.00	4	2.58	1.29
	Beat Synchronization (Post)	94.50	4	0.58	0.29
	Rhythm Pattern Imitation (Pre)	67.25	4	17.65	8.83
	Rhythm Pattern Imitation (Post)	79.75	4	12.29	6.14
Guitar Hero	Beat Synchronization (Pre)	88.50	4	6.86	3.43
	Beat Synchronization (Post)	92.25	4	5.56	2.78
	Rhythm Pattern Imitation (Pre)	71.25	4	10.31	5.15
	Rhythm Pattern Imitation (Post)	79.75	4	5.12	2.56

Table 2

Beat Synchronization Paired Samples T-Test with Hedge's g

Group	Mean	Std. Deviation	t	df	Sig. (2-tailed)	*g*
Beat Saber	-2.50	2.08	-2.40	3	.096	1.26
Guitar Hero	-3.75	2.75	-2.72	3	.07	2.49

Note: $p < .025$

Table 3

Rhythm Pattern Imitation Paired Samples T-Test with Hedge's g

Group	Mean	Std. Deviation	t	df	Sig. (2-tailed)	*g*
Beat Saber	-12.50	6.46	-3.87	3	.03	3.87
Guitar Hero	-8.50	7.94	-2.14	3	.12	2.78

Note: $p < .025$

Table 4

SFSS-2 & RPT-R Descriptive Statistics

Group	Test	Mean	Std. Deviation	N
Beat Saber	RPT-R (Post)	82.50	9.54	4
	SFSS-2 (Final)	4.88	0.13	4
Guitar Hero	RPT-R (Post)	83.00	4.24	4
	SFSS-2 (Final)	4.65	0.57	4

Table 5

Correlation of Flow and Rhythmic Achievement in Beat Saber

		RPT-R (Post)	SFSS-2 (Final)
RPT-R (Post)	Pearson Correlation	1	-0.680
	Sig. (2-tailed)		0.320
	N	4	4
SFSS-2 (Final)	Pearson Correlation	-0.680	1
	Sig. (2-tailed)	0.320	
	N	4	4

Note: $p < .05$

Table 6

Correlation of Flow and Rhythmic Achievement in Guitar Hero

		RPT-R (Post)	SFSS-2 (Final)
RPT-R (Post)	Pearson Correlation	1	0.097
	Sig. (2-tailed)		0.903
	N	4	4
SFSS-2 (Final)	Pearson Correlation	0.097	1
	Sig. (2-tailed)	0.903	
	N	4	4

Note: $p < .05$

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