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Listening to Music while Studying

For a year and a half, I have permitted students in my seventh, eighth, and ninth grade social studies classes to listen to music during class time designated as “working periods”. During working periods, students are collecting information for the creation of study guides, studying, and taking quizzes in the form of brief compositions. The only stipulations were that students had to be passing the class, had to use a play list so that they were not stopping work to switch songs, and had to keep the volume low enough such that I could talk to them when I needed to without difficulty. As a result of my observations in the classroom, research in the areas of music while studying, and studies in “cognitive load”, I am revising the policy starting January 2016. Listening to music during working periods will be a privilege now limited to students who are granted a “license” based on GPA and other relevant factors, including understanding the research described in this paper.

Research on the effects of listening to music while studying are not consistent. I listen to music while I work. A book by Don Campbell called "The Mozart Effect : Tapping the Power of Music to Heal the Body, Strengthen the Mind and Unlock the Creative Spirit" published in 1997 popularized the idea that people could be “smarter” if they listened to Mozart and similar music. This idea has been often studied. In a paper citing twenty-one sources, it is concluded that some, but not all, researchers find evidence that listening to music can temporarily improve some people's “spatial-temporal reasoning performance after listening to Mozart's music for 10 minutes.” The researcher goes on to note that “general intelligence is not affected” (Jenkins). When I was doing my graduate work in the mid-1990s, the idea that listening to baroque style music could improve one's cognitive performance was popular

and presented in my graduate courses. My students do not listen to Mozart, so perhaps this is not an issue. The supporting research on the “Mozart Effect” is inconclusive at best and would not alone support allowing students to listen to music while they study. This is an idea that has been mostly “debunked”. There have been some studies that have evidence of improvements in cognitive performance while listening to music (Cockerton, Moore, & Norman). There has been a lot of research contradicting these results: “[...] there was a detrimental effect on immediate recall on the memory test [...] when music was played” (Furnham & Bradley). A compelling and well-researched study by Dolegui concludes: “Results from the current study demonstrated how important it is to consider the effects of distracting music on cognitive performance. It was shown that the volume plays a crucial role and could be more important than the type of music played. **However, data from this study has demonstrated that silence seems to be the best environment to maximize performance when engaging in cognitive activity.** Classical music was **not** shown to enhance performance contrary to the study's expectations. Hence, the direct benefits of listening to music on cognitive processing could be more of a fantasy than a reality” (Dolegui) [Bold text mine].

Students will offer a number of arguments in favor of listening to music while they study, reasons for which supporting research cannot be found. Some say that modern-day students are so accustomed to being inundated in media that the added mental stimulation would not distract them. Their ability to select and discriminate input for attention, some would say, is stronger because they have to do it often. The opposite would appear to be the truth: “Early television exposure is associated with attentional problems at age 7” (Christakis, Zimmerman, DiGuseppi, & Mccarthy). Skillful management of attention, or the lack thereof in academically weaker students, plays an important role here. Clark and Mayer note that “...people have separate information processing channels for visual/pictorial and for auditory/verbal processing” and that “the capacity of each channel is limited” (Clark & Mayer 121).

Current cognitive theories about learning have identified these two learning channels as able to operate simultaneously. One explanation for why academically strong learners experience no apparent negative effect from listening to music while studying may be that the auditory channel is unused during their study, so it may be applied to the music while the visual channel is employed to study. Weaker academic learners also possess these two channels for receiving information, however. Why the use of channels in this way would not work for them may be a matter of attention or limitations in working memory where the information from both channels must be processed. A paper on learning and attention in *Educational Leadership* points out that “[o]ur brain is designed to simultaneously process information from at least two noncompeting stimuli or from different dimensions within the same modality” (Sylwester & Cho). The paper goes on to describe how “[o]ur attentional system constantly separates foreground from background and focuses on the foreground.” Academically strong students may simply periodically ignore the music, keeping it in the background and controlling their attention to their studies in the foreground. An interesting study at Stanford University found that music listeners are stimulated to focus their attention when music changes. “The research team showed that music engages the areas of the brain involved with paying attention, making predictions and updating the event in memory. Peak brain activity occurred during a short period of silence between musical movements - when seemingly nothing was happening” (Baker). Perhaps academically stronger students benefit more from this effect. A paper published by Stanford University notes that “[p]eople who are regularly bombarded with several streams of electronic information do not pay attention, control their memory or switch from one job to another as well as those who prefer to complete one task at a time [...]” (Gorlick). Whatever the case may be, there is insufficient evidence supporting an outright ban music in the classroom.

Some students suggest that the music is necessary to stimulate their interest in what they are studying;

to “wake them up”. They claim that they work faster and more efficiently with music playing. This fails to be demonstrated by research, which reveals that stimulative music is a “stronger distractor and obstructs cognitive processing more than sedative music does” (Dolegui). A final argument one hears in favor of permitting music while studying is that it is relaxing. For students who suffer from performance anxiety, they would claim that calming music helps them focus on their study instead of their anxiety. All of these arguments may merit further consideration. However, the preponderance of studies give evidence that background music is a distractor that detracts from studying in most, though admittedly not all, situations.

Some research has attempted to explain the contradictory results from study to study. Some have hypothesized that listening to a type of music that one likes is better. Some have wondered whether introverts benefit from no music or sedative music and extroverts benefit from more upbeat songs or “stimulative music”. Still others have wondered about volume. Results of a study by Smith & Morris “indicated that participants performed worse [on homework] while listening to their preferred type of music” (Dolegui). Participants in the study by Smith and Morris cited in Dolegui performed best “who listened to no music at all” (Dolegui).

It is not possible to read the research on listening to music and cognitive performance and conclude that for every student in every situation it is either right or wrong. The inconsistency in research conclusions supports the idea that it entirely depends on the person in his/her particular situation. What is certain, however, is that for students who are not academically strong, it is a decidedly and universally bad idea.

With regard to the role of attention, Dr. Ronald Siegel explain an experiment that demonstrates a phenomena called “inattentional blindness” that is worth quoting here in full:

“There’s a well-known video of students playing basketball, and they’re wearing black shirts and white shirts. The task that people are assigned is to watch how many times the students in the white shirts pass the basketball on the video. In the middle of the video, a big black gorilla comes in, beats his chest, and exits the stage. When people are asked to count the number of times the students with the white shirts pass the basketball, about two-thirds of the audience simply doesn’t see the gorilla. This is called inattentional blindness. Perception—what we see—is terribly conditioned by culture, language, and desire. What happens in the video is that we’re trying to get the number right, so we don’t see the gorilla at all.” (Siegel, 34)

Given the choice of a school assignment or the music in one's ear, it seems clear to me that the risk of inattentional blindness to the school assignment is particularly high among most students. If the student's favorite song is playing or if a YouTube video is active on one of the browser tabs, the attraction of this stimuli over the school assignment is likely to be great.

I am swayed by research indicating that it is entirely a question of stimulation and attention to stimuli; that the impact of music while studying entirely depends on the **cognitive load and the capacity of the individual to carry that load**. The term for the burden working memory has to carry “in the form of information that must be held plus information that must be processed is *cognitive load*” (Clark & Mayer 41). My informal observations have been that students with strong academic ability do not suffer an impairment of their performance because they listen to music while studying. Some people have a greater carrying capacity for cognitive load, as seen in their working memories. In fact, academic success is becoming more associated with the carrying capacity of the working memory than with IQ. “[...] a child's success in all aspects of learning is down to how good their working memory is regardless of IQ score. Critically, working memory at the start of formal education is a more powerful

predictor of subsequent academic success than IQ in the early years” (Alloway). “Kids with weak working memory skills have trouble staying on task to get to the end result” (Morin).

During the working periods of my social studies classes, students are engaged in a variety of academic tasks all of which in one form or another rely on the working memory. While reading to produce a summary, the working memory is involved in reading comprehension (Morin). While constructing a study guide from a source text or video, the working memory is involved. While rehearsing information for storage in long term memory, the working memory is a necessity. Writes Clark and Mayer: “Working memory must be free to rehearse the new information provided in the lesson. When the limited capacity of working memory becomes filled, processing becomes inefficient. Learning slows and frustration grows” (Clark & Mayer 41). Learning experiences are better when they “omit background music”. Less, says Clark and Mayer, is more. (Clark & Mayer 41) “Background music and sounds may overload working memory, so they are most dangerous in situations in which the learner may experience heavy cognitive load” (Clark & Mayer 153). “[I]f cognitive overload takes place, then learners will be more likely to make errors, not fully engage with the subject materials, and provide poor effort overall. The change in the schematic structures and pathways will not occur, simply because the learner cannot process the information being offered within the lesson” (Pappas). My own informal observations while circulating the classroom can be explained by cognitive load theory. I often observe my less-academically able students to be “spinning their wheels” as I circulate the room, being at about the same place in their work as the last time I visited their desk some ten minutes previously. Some students have been using a streaming video web site such as YouTube for background music. Frequently, I pass by their desk and see them watching the video. Now they have added a visual stimuli to the auditory. How can there be room for studying history? On challenge, they often reply that they are merely changing channels. One time a student asked to sit in the hallway to work because she felt

she could concentrate better. Headphones in, she returned to class at the end of the period having accomplished nothing.

It may not be surprising to some to find that allowing this privilege of listening to music during working periods to anyone passing the class added a management dimension to my work that affects my own cognitive load as a teacher. Students whose grades fluctuate from passing to failing throughout the semester cannot be relied upon to refrain from music when their grades are too low. I cannot afford the time to check their grades in the middle of class. Time is also consumed in reprimanding students who knowingly violated the rule about passing or telling students to lower their volume. There is no need for listening to music that would make this added management workload worthwhile.

The experiment draws to a close. Now only students (1) whose GPA is over 84¹, (2) whose grades are stable over time, and (3) who show understanding of this body of research may apply for a license to listen to music during working periods. Management will be greatly simplified to a list of such licensed students which will not likely often change. Students' education can be enhanced if they learn about the science. Knowing the effects of listening to music on their own particular individual capacity for carrying a cognitive load will be of great benefit to them. Students who show greater academic success have greater carrying capacity for cognitive load; they have muscular working memories (Alloway) that are not phased by the extra input music provides. I am listening to a Pandora station of classical music even as I write this paper. No doubt can be cast on the idea that music is a detrimental distraction for some, perhaps most, students. Only a limited case can be made that listening to music is actually helpful. However, for those students whose evident carrying capacity is such that listening to music

¹ Students whose GPA is 85 and above at Schroon Lake Central School have the honor of being designated as "SuperScholars". This seems a logical criterion as well for a privilege such as this.

while working is benignly pleasant, I am comfortable permitting the privilege.

Works Cited

- Alloway, Tracy P. "Working Memory Is a Better Predictor of Academic Success than IQ." *Psychology Today*. Psychology Today, 21 Dec. 2010. Web. 26 Dec. 2015.
<<https://www.psychologytoday.com/blog/keep-it-in-mind/201012/working-memory-is-better-predictor-academic-success-iq>>.
- Baker, Mitzi. "Music Moves Brain to Pay Attention, Stanford Study Finds." News Center. Stanford University, 1 Aug. 2007. Web. 27 Dec. 2015. <<https://med.stanford.edu/news/all-news/2007/07/music-moves-brain-to-pay-attention-stanford-study-finds.html>>.
- Jenkins, J. S. "The Mozart Effect." *Journal of the Royal Society of Medicine*. The Royal Society of Medicine, Apr. 2001. Web. 26 Dec. 2015.
<<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1281386/>>.
- Christakis, Dmitri, Frederick J. Zimmerman, David L. DiGiuseppe, and Carolyn A. McCarthy. "Early Television Exposure and Subsequent Attentional Problems in Children." AAP Gateway. Pediatrics, Apr. 2004. Web. 26 Dec. 2015.
<<http://pediatrics.aappublications.org/content/113/4/708>>. VOLUME 113 / ISSUE 4
- Clark, Ruth C and Richard E. Mayer. "E-Learning and the Science of Instruction: Proven Guidelines for Consumers and Designers of Multimedia Learning". 3rd ed. Pfeiffer, 2011. Kindle ebook file.
- Cockerton, Tracy, Simon Moore, Dale Norman. "Cognitive Test Performance and background Music." 1997: *Perceptual and Motor Skills*, 85 (3. pt 2), 1435-1438.
- Dolegui, Arielle S. "The Impact of Listening to Music on Cognitive Performance." *Student Pulse* 5.09 (2013). <<http://www.studentpulse.com/a?id=762>>.
- Furnham, Adrian and Anna Bradley. "Music while you work: The differential distraction of background

music on the cognitive test performance of introverts and extroverts.” *Applied Cognitive Psychology*, 1997: 11(5), 445-455.

Gorlick, Adam. "Media Multitaskers Pay Mental Price, Stanford Study Shows." Stanford University. Stanford University, 24 Aug. 2009. Web. 27 Dec. 2015.
<<http://news.stanford.edu/news/2009/august24/multitask-research-study-082409.html>>.

Morin, Amanda. "5 Ways Kids Use Working Memory to Learn." Understood.org. Understood, 16 Dec. 2013. Web. 27 Dec. 2015. <<https://www.understood.org/en/learning-attention-issues/child-learning-disabilities/executive-functioning-issues/5-ways-kids-use-working-memory-to-learn>>.

Pappas, Christopher. "Cognitive Load Theory And Instructional Design." ELearning Industry RSS. ELearning Industry, 05 Feb. 2014. Web. 26 Dec. 2015. <<http://elearningindustry.com/cognitive-load-theory-and-instructional-design>>.

Siegel, Ronald D. “The Science of Mindfulness: A Research-Based Path to Well-Being.” Lecture Course Guide. The Teaching Company, 2014. Web. 24 January 2016.

Sylwester, Robert, and Joo Yun Cho. "What Brain Research Says About Paying Attention." *Educational Leadership: Students at Risk: What Brain Research Says About Paying Attention*. Educational Leadership, n.d. Web. 27 Dec. 2015. <<http://www.ascd.org/publications/educational-leadership/dec92/vol50/num04/What-Brain-Research-Says-About-Paying-Attention.aspx>>.

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