Scholarly Article Critique

**Student Name:** Victoria Vollmershausen

**Case & Diagnosis:** Low Back Pain (Case 7) – Practice Component

***Summary and Critique of Scholarly Articles***.

**Title of Article:** Practice Schedule and The Learning of Motor Skills in Children and Adults: Teaching Implications

**Add PDF link of article to website.**

1. **Article title information.**

Zipp, G. P., & Gentile, A. M. (2010). Practice Schedule And The Learning Of Motor Skills In Children And Adults: Teaching Implications. *Journal of College Teaching & Learning (TLC) TLC,* *7*(2).

1. **Describe how this article is pertinent for your topic. Does it provide proof of a clinical concept? Does it explain a procedure that is needed for your topic? What are the implications for your topic?**

This article takes an in-depth look at practice scheduling and motor learning. Generally speaking, this article can be applied to the case of low back pain when teaching new skills such as posture, postural control, strengthening and stretching. However, because this study was not focused on low back pain specifically, the occupational therapist would have to adapt the information and discern which conclusions are clinically relevant to their case. Since not a lot of practice scheduling information exists specifically for low back pain and since there is not a high volume of literature that links these two concepts, I concluded that this is some of the best available evidence in this field.

From this article, I have learned that the best way to support the learning of new skills in my client is to provide a blocked practice environment. This means that a single skill is performed repetitively, with variation in training minimized as much as possible. After this skill has been mastered, blocked practice of another skill may occur. This allows the learner to derive a general solution to the motor pattern before contextual variability is introduced. Once the learner has established and mastered that initial pattern, random practice may be introduced. This has clear implications for the ways in which we, as occupational therapists, must teach our clients new skills.

1. **Write a precisé of the article, including:**

This study was designed to help researchers determine the best way to ensure effective motor skill attainment when teaching a novice learner. In particular, authors hoped to determine the implications of different practice scheduling techniques in order to determine which resulted in the greatest learning outcomes. The authors posed the question “does repetitive practice of the same motor task (blocked practice) make for better learning of the task or does randomly practicing different motor tasks (random practice) demonstrate a greater benefit.” Outcome measures looked at both skill acquisition immediately after learning and retention. In looking at this question, researchers were also assessing the differences in the effectiveness of the two practice types when applied to adult learners and child learners.

To complete this study, 12 adults between the ages of 20 and 30 were selected and 12 children between the ages of eight and ten years old were also selected. In order to qualify for this study, participants were required to be novices of the task and were subjected to throwing trials to ensure that they met this criterion. The 24 participants were then randomly assigned to four groups: blocked practice – child, blocked practice – adult, random practice – child and random practice – adult.

The tasks selected for practice analysis was a frisbee throw. Various targets were determined and marked by different colours, with the researcher indicating which colour target the participant was aiming for. Participants were allowed to use their preferred hand and were instructed to maintain their starting position within a specified square throughout the movement. The throwers were not given any information regarding how their movement patterns should be organized.

During blocked practice, the frisbee was thrown to each of the three targets for nine successive trials and the blocked format was repeated again. This resulted in a total of 54 trials. During random practice, three targets were presented nine times in a varying order within two blocks of 27 trials. Again, this resulted in a total of 54 trials. During random practice, any particular target could not be tested more than twice in a row. During breaks, participants were required to read and answer questions in order to negate the practice effect.

Retention tests were completed following the same procedure. These tests were completed 30 minutes after skill acquisition and seven days later. Participants were not allowed to engage in related tasks during the 30-minute period between the completion of skill acquisition trials and subsequent testing.

After the 30-minute retention test, two transfer tasks were given to the subjects. The first task included the same object but a different target (SODT). For this portion of the study, the individual was required to throw the Frisbee to a target located at a different distance than the target used in practice. In the second task, participants were required to throw a different object - a ropeball - to the same target (DOST). For each of the two transfer conditions, four test trials were administered for each target in a random order. Deviation from the target was measured in centimeters.

A 2 x 2 multifator analysis of variance (ANOVA) was completed for acquisition, retention and transfer. When required, another factor was added. Partial eta squared was used to measure the effect size and Scheffe post hoc analysis was used for individual comparisons between norms.

It was determined that during skill acquisition, children displayed poorer throwing accuracy than adults. However, performance tended to improve for both groups over multiple trials. Skill acquisition showed no difference between the two types of practice schedules.

During the retention testing period, it was found that accuracy was higher after blocked practice for both age groups (when compared to random practice). From this experimental design, authors were able to conclude that skill retention was improved with blocked practice. This lead the researchers to purport that task variability should be restricted during initial learning of complex tasks, in order to provide an opportunity for the learner to stabilize their movement topology.

Transfer tests produced a variety of results. When the SODT task was introduced, children trained with random practice performed the worst, demonstrating the highest deviation from the target. Adults trained with random practice tended to perform better than the children trained using the same type of practice scheduling. Children and adults trained with blocked practice produced similar outcomes, showing no differences between the age groups. On the DOST task, the only statistically relevant finding was that adults had a higher throwing accuracy than children. However, on the SODT test, it was noted that children and adults trained under blocked practice performed similarly (ie. the age difference in throwing accuracy was effectively negated). Researchers believed that blocked practice enhanced children’s learning so they could cope with the new target in a similar manner to adults. Children trained under random conditions produced the poorest transfer for SODT transfer tests, meaning that children do not benefit from random practice for complex movement tasks during the initial learning phase. On DOST, adults performed better than younger participants, regardless of practice conditions. This was likely because adults have more experience throwing various objects, which in turn lead them to perform at a higher skill level.

In conclusion, for a novice learner of any age blocked practice was found to be more beneficial to learning. It is believed that this type of practice schedule allows for the performer to derive a general solution to the motor program before mastering the more complex components of the task. Eventually, learners would then be able to move on and become more proficient at coping with contextual variability. Once learners have established a thorough understanding of the movement, high contextual variability (ie. random practice) may be beneficial as it allows the fine tuning of the general movement pattern previously established to variations in task conditions.

At the beginning of the paper, the author highlighted several noteworthy studies that had been done in this area. They listed outcomes that both supported and contradicted the results found in this study, explaining why further research in this area might be necessary. Not only did they support the reader in understanding why the outcomes of these studies are necessary for effective teaching, but they also provided evidence to support that it is necessary to understand these results to allow the teacher to better support the learning of the student.

Overall, I felt that this was a high quality study completed with a high degree of rigor, which lends itself as valuable evidence in the field. However, I was concerned by the fact that retention testing was not done beyond the 7-day mark. As an occupational therapy candidate who will eventually be teaching skills to patients, it is important for me to understand how these skills will change and be used over time. When I am teaching clients skills, I want to ensure that they will be long-term skills that continue to be effective not only days after learning, but also months and years following. This is particularly true of patients with chronic and/or progressive conditions. In order to give this study more merit, I would like to see retention trials done after longer periods of time, in addition to the initial retention trials that were completed. I was also concerned that this study was done using only two tasks, which limits the generalizability. Frisbee throwing and ropeball tossing are both fairly simple motor skills, often mastered by children at a young age. I would like to see how these findings hold up when tested on tasks of a more cognitive or complex nature. However, it is important to note that the failure of the researcher to test these findings on more cognitive tasks is not a true limitation of the study, since the article was explicitly titled “Practice Schedule and the Learning of Motor Skills in Children and Adults.”