If you are not familiar with my previous work, please consult the study proposal here.

For this project, my original plan was to use an existing application, Uchubuka (Учубука), (MobileUp, 2012) to train a two-and-a-half-year-old male subject in letter recognition (LR) and phonological awareness (PA) of the Russian alphabet in an exploratory, single-participant study. The study proposal called for an initial test, followed by a one week training period, where the subject would be trained in the use of the application. In subsequent weeks, the training time would be manipulated and weekly tests would be administered to determine progress. The proposal included two hypotheses:

1. There will be a significant improvement in both, phonological awareness and letter recognition following the initial three-week exposure period. If true, this hypothesis will be used to provide evidence of the efficacy of the app on learning outcomes.

2. There will be no significant difference in improvement in either phonological awareness or letter recognition between the last two rounds of testing. If true this hypothesis will be used to provide evidence that shortening screen-time to levels more in line with AAP recommendations will not have a negative impact on learning outcomes.

Using the application's "test" mode, testing data would be manually collected and statistically analyzed to either accept or reject the null hypotheses.

On day one, I began to experience the challenges of working with a two-year-old subject. Non-compliance was a major issue, as the subject would become frustrated, loose interest and turn off the application within minutes of exposure. After a disastrous start that involved an emotional outburst and a temper tantrum, it became apparent that the research plan would need to be amended. I went back to the drawing board, and decided to use a four-and-a-half-year-old, who is already proficient in the use of the application to train the subject in a peer-to-peer format. Collaborative play and peer-to-peer tutoring have been shown to be effective educational tools in previous studies.

In a 1986 study, Piggot, Fantuzzo, and Clement evaluated the effects of peer-to-peer tutoring on twelve underperforming fifth-grade subjects. Over the course of twelve weeks, daily peer tutoring sessions with higher-achieving classmates improved the educational outcomes for the experimental group to levels indistinguishable from their peers (Piggot, Fantuzzo & Clement, 1984). These results have been widely replicated in a variety of study designs with subjects that belong to different age groups. Cross-age tutoring programs have been especially successful.

Cross-age tutoring involves a tutor that is a few years older than the tutee (Libby, 2016). A pilot program launched at a Canadian elementary school paired eighteen underperforming second graders with high-achieving fourth graders in weekly online tutoring sessions (Libby, 2016). The program was found to improve academic performance for both groups and promote responsibility and empowerment (Libby, 2016). Peer-to-peer tutoring and collaborative play have also been found to improve classroom behavior and compliance.

In a 2015 study, Yaoying Xu randomly assigned seventy-five English second language learning (ELL) preschoolers to an experimental and control groups, with the experimental group receiving daily peer-tutoring in the form of social interactions with native English speaking peers. The author found that the experimental group demonstrated significant improvement when compared to the control group in positive social interaction behavior, receptive language, and classroom compliance (Xu, 2015).

In an attempt to apply these findings to my current research problem, I allowed the four-and-a-half-year-old subject to tutor the two-and-a-half-year-old on using the application in daily sessions for a period of one week. While the initial target was tutoring sessions of one hour, I discovered that that goal may have been overly ambitious. Instead, the tutoring sessions were self-paced and their length was recorded with the hopes of analyzing the results at a later time for statistically significant differences. The current hypothesis is that the tutoring session length will steadily increase, which provides evidence of improved compliance.

During the second and third weeks, I was able proceed with the study according to the original plan with limited changes. Specifically, due to compliance issues I will not be able to vary the session times as the experimental variable. Instead, all the training and testing sessions will be self-paced and once data is collected, the differences in session time will be analyzed. The hypothesis is that session times will steadily increase and reach a plateau, which provides evidence of improved compliance and increased interest. Those should, in turn, have a positive effect on learning outcomes.

The most important lesson I learned so far is that even the best, most detailed research plans need to be adjusted when implemented in the real world. Fortunately, this is an exploratory study that does not require IRB approval and these adjustments can be made on the fly. Human subjects, especially children will not behave in the ways you expect them to behave once you start the experiment. Working with these populations requires a certain degree of flexibility on the part of the researcher.

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