CS 6460 Qualifier Question

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1 BACKGROUND

The journey began with my involvement in the Tapestry Tool project during my undergraduate studies, which has since evolved into an open-source online learning platform. This platform intrigued me with its innovative graph-based structure, simplifying content relevance through edges and nodes and transforming traditional teaching into a multidimensional experience. It harnesses human memory's capacity for correlations to enhance teaching quality, prompting me to explore the potential of similar technologies in various learning phases.

Now, as part of the CS6460 Research track, I aim to investigate the role of educational software in student engagement in the online learning context. My research will focus on understanding how technology can stimulate students' curiosity and intrinsic motivation to increase their engagement and ultimately enhance learning quality. I have identified graduate students as my target demographic for my surveys and data collecting primarily because of the feasibility.

This week, I have been consolidating my resources and shaping my research by answering the below qualifier questions.

2 QUALIFIER QUESTIONS

2.1 How do you plan to utilize technology to enhance the quality of learning by stimulating curiosity and self-motivation in students?

I want to stimulate students' curiosity and self-motivation mainly by shifting knowledge delivery methods. In contrast to traditional linear forms of instruction (such as lessons, tutorials, assignments, and exams), I expect the educational software I employ to present the content as entertaining or lifelike. Accordingly, I want my research to take advantage of the participants' fragmented time as opposed to a big chunk of time spent studying - this allows my surveys to give participants time flexibility and does not add to their existing heavy workloads. Interestingly, I came up with the answer to this question when I bumped into the Duolingo mascot (*Figure 1*) at the GHC23 Expo.

Figure 1— The Duolingo mascot at the GHC23 Expo.

I think leveraging Duolingo for my research would be a great choice. As Luis von Ahn describes in the interview with Lindsay, when he and his co-founder, Severin Hacker, tried to learn each other's native language in the traditional way (the first version of Duolingo), "It was so boring" and "it is hard to stay motivated," so they decided to make Duolingo to be more like levels-based games instead of a robotics learning tool (Luis & Lindsay, 2023). Duolingo is a good fit for my philosophy of Education and the topics I want to study now. Moreover, Duolingo's designers have taken aligning tasks with psychological needs into account in the curriculum design, which aligns with Vansteenkiste et al. (2004) Self-Determination Theory to enhance the learning outcomes ultimately. Even better, Duolingo is a free app so far, so I do not need a budget for my research.

Specifically, I will first invite some students to be a part of my research, randomly divide the study participants into a control group and a treatment group, and then ask them to learn a new language that is not in their native language system within the next two months - if the participant is a native speaker of Chinese, then I might suggest Portuguese; if the participant is a native speaker of Spanish, then I would suggest Japanese, and so on. Participants in the control group will follow the traditional learning style to learn the new language, while members of the experimental group will use Duolingo to learn the new language. Yeung, Carpenter, and Corral (2021) gave me good examples of conducting the experimental settings, collecting the data and then analyzing to conclude cool findings.

As the study's initiator, I will ensure that the participants have no previous knowledge of the language they will be learning before the study begins and that they will start and finish on the same day, for half an hour each day in between. I will measure the final quality of their learning through free tests provided by Duolingo. The participants' test results will serve as a data source for my analytical study, and I will rely on this data to draw my conclusions.

2.2 Would you deploy such technology in a real-life context based on the literature you have reviewed?

Based on the extensive literature I have reviewed, I would wholeheartedly deploy Duolingo and its Learning Philosophy in a real-life context. Moreover, I have first-hand experience using Duolingo for my Japanese language learning in 2019, which has further solidified my belief in its effectiveness.

The research by Huang et al. (2019) provides compelling evidence for incorporating interactive, emotionally engaging elements into virtual learning environments. Duolingo aligns perfectly with this theory. It employs a two-fold approach to enhance engagement and learning. Firstly, the platform organizes its lessons in a way that progresses in difficulty levels, allowing learners to build their skills gradually. Secondly, the content is presented as an interactive game, making learning enjoyable and immersive. These thoughtful design choices facilitate knowledge accumulation without overwhelming learners, fostering sustained learning behaviours.

Furthermore, Duolingo's design promotes active engagement and interaction, which is essential for effective learning, as Orcutt and Dringus (2017) emphasized. The platform encourages authentic connections with students by creating an environment where they can actively participate, share experiences, and exchange knowledge. This enhances the learning experience and builds a sense of community among learners, which can be a crucial motivational factor in language acquisition.

In line with Yeung, Carpenter, and Corral's (2021) findings, technology is often considered neutral when presenting information. However, its true potential is unlocked when it offers unique affordances that align with practical learning principles. Duolingo, in this regard, stands out as an exemplary platform. It provides a range of unique features and tools that leverage practical learning

principles, as described above. The platform's adaptability to different learning styles, its focus on repetition and reinforcement, and its use of spaced repetition algorithms are just a few examples of how Duolingo maximizes language learning efficiency.

2.3 You have chosen graduate students as your target demographic. What pros and cons does making this choice present?

2.3.1 *Pros*

Feasibility – Conducting surveys and collecting data from OMSCS graduate students can be more feasible for this one-semester project than other demographics because I am one of these students and have the most direct contact with them during the class.

Relevance – Given the increasing prevalence of online learning and the use of educational software (Especially for the students enrolled in OMSCS), the research topic is highly relevant. Understanding how technology can enhance engagement is essential in the current educational landscape. The students are more accessible to me and expected to be willing to participate in surveys because of the participant credits and passion for Educational Technology.

Tech Tool Friendly – OMSCS itself is an online learning program which not only provides a natural online learning environment for my research but also makes the enrolled students already familiar with the use of educational software - which will significantly save me the cost of educating them to learn to use specific learning tools.

2.3.2 *Cons*

Sample Bias – Graduate students may have different motivations and engagement levels than other populations, which can vary based on their circumstances, academic field, and career goals. This can introduce bias into my research. If I only based my data collection and analysis on graduate students, Sample Bias may make my conclusions lack generalizability towards other demographics.

Complexity – Investigating the role of educational software in student engagement is a complex endeavour. There are many variables to consider, and isolating the impact of technology from other factors can be challenging. Additionally, the enrolled students come from different cultural backgrounds, age groups, and

previous knowledge, which will lead to challenges in designing the surveys in my research. For example, I need to consider how to phrase my questions so that they are neutral and unoriented to students from different backgrounds to give the most natural and honest answers.

3 REFERENCES

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