Gamification to Train Soft Skills of Software Professionals Through Active Video Watching

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Abstract: Soft skills play a major role in the success of software development projects. However, learning soft skills is difficult. Video-based learning (VBL) provides self-paced and flexible learning but is often a passive method. Therefore, Active Video Watching (AVW) has been proposed to increase engagement and learning. We investigate gamification as an intervention to enhance the soft skill training of software professionals using AVW. The proposed research method includes both quantitative and qualitative approaches.

Keywords: Active video watching, gamification, soft skills, software professionals

1. Introduction

Software development does not only require technical skills but also involves different processes and interactions with multiple stakeholders, such as clients, project managers, and development team members (Matturro et al., 2019). The skills required to fulfil non-technical activities are called soft skills. Soft skills can be defined as "intra- and inter-personal (socio-emotional) skills, essential for personal development, social participation, and workplace success," which includes communication and teamwork (Kechagias, 2011). Furthermore, according to Gallagher et al. (2010), soft skills leverage technical skills. Since the production of software involves a human factor to some extent and soft skills have a major impact on a person's behaviour with others in a work environment, soft skills play a significant role in software projects to be successful (Ahmed et al., 2013; Mtsweni et al., 2016). However, learning soft skills is difficult and time-consuming (Iorio et al., 2022).

Video-based learning (VBL) has attracted attention as a popular method of learning in recent years due to its self-paced, flexible way of learning (Giannakos et al., 2016; Pal et al., 2019). However, VBL can still be a passive learning activity (Seo et al., 2020). Recent research has found that the more the learners engage in various activities, the more learning they gather (Koedinger et al., 2015). Therefore, there have been significant attempts to increase engagement in video-based learning (Mitrovic et al., 2019).

Gamification is the use of game design elements in non-game contexts (Deterding et al., 2011). Since gamification can increase user engagement through intrinsic motivation (Hong & Masood, 2014), the education sector has been among the top domains where gamification has been researched to increase engagement and learning (Hamari et al., 2014). In this project, we investigate the use of gamification as an intervention in AVW to increase the learning of soft skills of software professionals. We will address the following research questions (RQ):

1. What are existing gamification approaches that have been proposed for learning soft skills?
2. What are the effective gamification approaches for software professionals to undertake active video-based training?

3. To what extent will gamification increase engagement and learning in active video-based training of software professionals?
4. What are the perceptions of software professionals when using gamified active video watching for development of soft skills?

Answering RQ1 and RQ2 will result in an empirically evaluated set of gamification elements that can be incorporated into training platforms for soft skills for software professionals. The magnitude of the effect of gamification on the software professionals' soft skills training will be evaluated through RQ3. Furthermore, from RQ4, the project will validate its findings through an industrial scenario by evaluating the perceptions of IT professionals. This will be beneficial in assessing how the gamified AVW fits within the organizational context setting and professional development plans of the professionals.

2. Literature Review

2.1 Gamification

The objective of incorporating gamification into a system is to increase the users' intrinsic and extrinsic motivation to get them involved in the tasks by integrating playful activities (Buckley & Doyle, 2014). Klock et al. (2020) state following game elements as the most used in tailored gamification: Customization (the ability to customize virtual space or character in a gamified system), Badges (a visual representation of an accomplishment), Challenges (a task that requires effort to complete), Levels (an element that supports user to track progression on system's purpose over time), Competition (an element that allows social comparison between users), Leader boards (an element that orders users according to a criterion).

There are few studies that look at gamification for professionals. There have been positive perceptions from professionals in using gamification in the software and healthcare industry (Lobin & Kevin Sungkur, 2023; Lemermeyer & Sadesky, 2016). For example, Stanculescu et al. (2016) present an experimental study where authors developed a web-based online application utilizing Work & Play gamification framework. They presented the gamified platform to IBM company employees for two months to identify how gamification can enable them to foster employee engagement with their day-to-day tasks. The platform was a learning and social interaction web application utilizing leader boards, badges, and scores as gaming elements. The authors conducted a between-subject, post-test with 206 employees by using application logs and a questionnaire to measure perceived engagement and perceived learning. The authors state that the level of engagement achieved via game elements was high, and the web-based application was successful in promoting knowledge acquisition. Leader boards and badges have positively affected user engagement, and the combination of the above game elements has been found to be more effective in enhancing the average session length a user spends on the platform (Stanculescu et al. 2016).

2.2 Active Video Watching

AVW utilizes reflective activities such as writing comments, and rating comments in contrast to a traditional video-based learning platform (Lau et al., 2016). By integrating such activities, learners improve their engagement and learning while leveraging the experience from video-sharing social media websites such as YouTube (Dimitrova et al., 2021). One example implementation of AVW is AVW-Space, an online platform that facilitates interactive notetaking by enabling users to write comments about the content of the videos they watch and rate comments written by other learners on the same videos (Lau et al., 2016; Mitrovic et al., 2016).

There are few studies that explore AVW and soft skills: Mitrovic et al. (2017) present results from a study conducted with university students on presentation skills (a soft skill) in

AVW-Space. It found that learners who undertook commenting on videos and rating their peers' comments in AVW-Space have accumulated increased conceptual knowledge of the soft skill. Following that, more interventions have been developed to increase learning in AVW-Space, e.g., reminder nudges to motivate learners to write more comments and quality nudges to encourage higher-quality comments (Mitrovic et al., 2019; Mohammadhassan et al., 2022).

3. Proposed Work and Research Method

This mixed-method study includes both qualitative and quantitative elements. We will use surveys, focus groups, control-experimental studies, and case study research methodologies. The proposed work will consist of six major research studies.

The first study was conducted as a preliminary survey with students, to collect insights on motivation, and perception on integrating gamification into active video watching. 103 respondents from New Zealand and the Philippines participated in this survey. Results show a positive perception towards integrating gamification into AVW with combinations of game elements instead of a specific element.

The second study is a systematic mapping study (SMS) to explore RQ1 and inform RQ2 as well. Based on the findings from the SMS, we will design the third study as a controlled experiment with software engineering students as proxies for entry-level software professionals. Selected gamification elements will be implemented in AVW-Space (an example AVW platform), and students will be given a fixed period to undertake soft skills training through the gamified platform. The control group will not interact with the gamification interventions. At the end of the study, data on the number of videos watched, comments written, comments rated on videos, and respective comment quality will measure learner engagement. A conceptual knowledge score obtained via questionnaires in pre-and post-tests will allow us to identify changes in learning. This will facilitate testing the developed interventions with students prior to the real study with software professionals.

The purpose of the fourth study is to validate the practical usability and improve the gamified intervention for software professionals. To do that, this study will be conducted as a focus group discussion with software professionals in the industry to get their feedback. The pre-tested gamified instance of the AVW-Space will be presented to these professionals, and the implementation will be critically analysed against different learning activities. This study will help answer RQ2.

The fifth study will be a similar experimental study to study three which will answer RQ3. Participants will be software professionals from the industry, recruited from crowdsourcing platforms (e.g., Amazon Mechanical Turk) to increase the number of participants. The purpose of this study is to analyse the engagement, and learning between control and experimental groups and identify whether gamification has a significant influence on the above factors. Based on the availability of professionals, we may have a more iterative single group approach to look at learning behaviours in AVW-Space as an alternative, since professionals might have multiple ways of achieving the learning key performance indicators.

The sixth and final study will be a case study conducted in a New Zealand software company with software professionals. Participants will undertake a soft skill training course in AVW-Space in their organizational environment. The purpose of this study is to collect professionals' perceptions on the usefulness of a gamified AVW platform for their professional development in a corporate organizational context. This study will help answer RQ4.

4. Conclusions and Expected Outcomes

This research aims at achieving two major outcomes. At the end of the study, the authors will provide empirically grounded foundations for using gamification approaches to improve the training of soft skills of software professionals. This will be followed by the development of an

actual learning platform with gamification techniques, tested and validated for the use in organizational contexts.

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