

Summary of 3 articles related with my main theme

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Can active learning techniques simultaneously develop student's hard and soft skills?

This study was conducted with the purpose of finding a relation between the development of hard AND soft skills using the active learning method Flipped Classroom. There have been a few studies on this topic before, but not correlate soft and hard skills, just focus on one or the other.

The study was conducted as follows: two classes were selected in the same semester, both taught by the same teacher, each lasting four hours. One class served as the control group with 31 students, while the second class was the experimental group with 32 students. In the control group, classes were conducted in a semi-traditional way (first two hours consisted of traditional lectures, and the last two involved active learning such as presentations, debates and teamwork). In the experimental group, all four hours followed fully flipped classroom method (the teacher provided students with a video-class on the day's topic before the in-class hours).

To collect the data on hard skills, they recorded the test grades of both groups at the beginning and in the end of the experiment. For soft skills, students answered a 25-question survey about the following subjects: Teamwork (TW), Self-efficacy (SE), Critical Thinking (CT) and Perception of learning (LP). The data was analyzed with Pearson Correlation (PC) and Canonical Correlation Analysis (CCA).

All the results of these surveys and grade analyses was somewhat of redundant, when something indicated that that was true, the next test indicated that it was false. So, at the end of the study there was no clear pattern between soft AND hard skills. Because of this, it cannot be affirmed that the FC per se improves or worsens this relation. Even though students got higher grades, it doesn't mean that they developed soft skills.

More research is necessary in order to find out which methodology is best for improving each skill, but we can guarantee that using different learning techniques depending on

whether we want to enhance soft or hard skills, is better than choosing one over the other. This study also shows that some active learn methods can have disadvantages in some specific topics, so it can't be seen as a perfect method for all needs.

It's important to note that this study may be affected by the fact that all tests were somewhat of a surprise for the students. They couldn't prepare for it, it was simply a way to measure the student's knowledge at that moment. Another limitation of this study is that the experiment was conducted at a university where the classrooms are small in order to guarantee a more personalized education.

Student Engagement in Active Learning Software Engineering Courses

Most engineering instructors prefer lecturing to teaching. But in this passive learning method, student engagement is very low and they can't develop soft skills. So, they wanted to prove that active learning methods actually help students be engaged with the class.

They took two classes (CIS 375 and CIS 487) with similar kind of activities and projects and put them to study the first time of the class with non-active learning and the second part with active learning methods like GBL, discussions, peer-reviews, design, etc. The whole process was observed by 2 students who wrote down the numbers of students engaged in every 10 minutes interval.

There was a clear indication in the results that this methods of active learning really helped students to maintain themselves engaged. Especially the GBL, which proved to be the most effective technique for engaging students.

The GBL could keep the students in the edge of their abilities and knowledge in order to force them to improve and keep evolving. It makes it easier to keep them engaged for the entire semester.

This active learning method works because of the engagement of the students in the activities, since it requires students to do something different or make some effort rather than just listen and take note; they have to think, talk, explain, etc. But this engagement by itself does not prove that students are learning. Instead, it creates an environment

that makes it much easier for students to enjoy the activity and pursue learning by themselves, without being forced to listen to someone.

The effects of game-based learning in the acquisition of “soft skills” on undergraduate software engineering courses: A systematic literature review

The software industry's demands for software engineers with competent knowledge are increasing. However, traditional methods of teaching is overwhelmed and it has not been able to handle the expectations of the industry. Therefore there is a need to explore modern alternatives for teaching in engineering education such as game based learning (GBL). This pedagogical method has a capacity to improve the way of learning and the development of hard and soft skills when compared to traditional method, using only frontal lectures. However, there haven't been many studies exploring which specific soft skills are promoted by GBL and what kinds of games are more useful for a specific skill. Therefore, this systematic literature review (SLR) of 96 studies about GBL aimed to answer the following RQs: (a) What kinds of games have been developed? (b) What software engineering areas have been addressed? (c) Which soft skill have been promoted? (d) How have these skills been evaluated? The studies were selected based on keywords, nine criteria and two validation exercises. At first they selected 361 studies but after passing through this filter only 96 studies were selected. The data of these studies were extracted by a EndNote version X9.

In order to answer the RQ1, the games were classified into the following genres (respectively from a higher frequency to a lower one): Digital games: Simulation, puzzle, role playing, trivia, strategy, platform, adventure, action, racing, arcade and fighting. Non-digital games: Card game, board game, paper and pencil game, role-playing game, educational toy. They concluded that the two genres were selected due to the fact that both can be easy to play and encourage collaborative learning.

Now, addressing RQ2 this SLR categorized 11 knowledge areas from the SWEBOK and correlated the frequency of each category in each study. The digital games turned out to be the most effective in the most areas, but software engineering management and

software engineering models and methods have been mostly addressed by the non-digital games.

To provide a response to RQ3, they took a list of 31 soft skills identified by Matturro. Of these 31 soft skills, 15 were identified in the collected studies. The most promoted were: (1) Motivation 100%; (2) Willingness to learn 72%; (3) Competition 67%; (4) Problem-solving 57%. The results show that digital games is slightly better compared to a non-digital games, however it doesn't mean the non-digital games is useless, it can be even better than digital games on specific skills such as communication and interpersonal skills. Therefore, each genre is better for specific development of skills, it will depend on which skill you want develop.

To respond to RQ4, this SLR only included studies that provided empirical results derived from a systematic evaluation. The article analyzed 4 types of studies classified as: (1) Experimental; (2) Quasi-experimental; (3) Nonexperimental; (4) Ad hoc; And in order to collect this data they mainly used: questionnaires, tests, interviews, observation, challenges or exercises, and/or other instruments.

Despite the results that GBL help in the development of soft skills in various cases, it is impossible to guarantee that is always generating positive effects, due to the fact that were a lot of different variables in each study such as size of the samples, time elapsed, methods, search strategy, data synthesis and inaccuracy of extracted data. Moreover, there are some areas that have not yet been explored by researchers such as programming and project management that appear to be more suitable for an GBL approach. So, in the future studies, researchers must consider adding more formality and using questionnaires and models such as FDF, EGBL, MEEGA, and MEEGA+.