



Título: Modeling, Development, Assessment and Empirical Evaluation of Personalized Study Guide-Based Flipped Classes in Software Engineering Teaching

Data: 23/02/2024

Horário: 14h00

Local: Sala de Seminários - Bloco 942-A (GREat) e Videoconferência (<https://meet.google.com/uqh-iawg-yde>)

Resumo:

Software Engineering (SE) teaching aims to provide a theoretical basis for students to develop a deep understanding of fundamental concepts and principles. However, such a theoretical basis must be combined with hands-on activities to improve practical skills and competencies to solve real-world problems, resulting in Software products. Furthermore, both hard and soF skills are mandatory in SE education. While hard skills cover the technical content, soF skills go beyond communicating, cooperating, connecting pieces of knowledge to discover solutions, and thinking critically. In Computer Science Education, Active Learning methods stand out as a student interactive approach, stimulating the building of knowledge instead of passively receiving it from instructors. In this sense, the literature reports many strategies to promote active learning to minimize the risks of students' low learning. Flipped Classroom (FC) is an active learning methodology focused on student engagement, recommending that students come to class after completing significant preparatory work. Unlike traditional approaches and face-to-face classes, FC learning content delivery occurs before class. This pre-study can help students to dedicate more meaningful learning activities collaboratively in class. Students should read or watch videos and analyze the lesson material before class time. Afterward, they will apply these concepts in classroom activities conducted by their teachers. The FC method could mitigate some challenges of SE teaching since it encourages professors to develop distinct learning experiences finding for any student, respecting their context. New technologies are needed to support transitioning from traditional passive teaching to the FC active method to ensure reliability, interactivity, and collaboration in a student-centered system. Performing real-time, adaptive learning monitoring is crucial for teachers to advise students efficiently. We modeled a personalized study guide-based flipped class to address this. We materialized the model on a platform capable of delivering online instructional materials, where the student's interaction with the previous content determines the nature of the materials delivered later. It is a web-based platform for creating personalized study guides for SE Flipped Classes. The tool adapts the guide content based on the student's performance and engagement. Within the tool, teachers set rules for content adaptation, focusing on class preparation and gaining insights into student progress. The process allowed the professor to create adaptive learning paths in a personalized learning experience. We evaluated the model in three stages. In the first stage, we interviewed Software engineering professors with and without experience in flipped classrooms and introduced our tool to gather data on technology acceptance. In the second stage, we assessed the impact of the model in a Software engineering class comprising twenty-two students. In the third stage, we conducted a randomized controlled experiment designing personalized flipped classes using the tool. We planned the experiment based on Software engineering flipped classes, both with and without personalized learning. The evaluation with professors showed an acceptance rate above 90% according to the technology acceptance model. The second stage encompassed an evaluation of a Software requirements lesson with 22 students, showing a significant improvement in scores and receiving positive student feedback. In the third stage, we evaluated our learning model using a randomized controlled experiment with 26 students divided into two groups (experimental and control). The results show positive student perception of the applied model, a significant reduction in anxiety, and increased engagement during the preparation of students in the experimental group. Our personalized study guide-based flipped classes model can support the enhancement of SE education. In this scenario, using adaptive learning technology and the flipped classroom method supported by an authoring tool positively contributed to student motivation, acceptance, engagement, and learning gain in Software engineering teaching. Thus, this thesis investigated

the effectiveness of using the flipped classroom approach blended with adaptive learning in teaching Software Engineering.

Banca examinadora:

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