Remote Pair Programming

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ABSTRACT

Pair programming is routinely used in industry and taught in face-to-face programming classes. Research indicates that it improves self-confidence and students' programming, communication and team working skills. We investigate the technology, barriers, and soft-skill benefits for distance-learning students who pair program with a remote partner online. In one study, students watched two tutors pair programming and then performed a pair programming task remotely with a student partner. Students felt significantly more positive with the latter compared to the former. As universities strive to provide a good student experience during a pandemic, these findings highlight the value of active remote pair programming using standard online communication tools.

CCS CONCEPTS

• Applied Computing • Education • Collaborative learning

KEYWORDS

Distance learning; pair programming; soft skills

1 INTRODUCTION & RELATED WORK

Pair programming can enhance programming skills and increase self-confidence of students learning to program [1]. Students interact and learn from each other in lab classes as well as from their educators, developing their programming skills by solving problems together. Prior research suggests such benefits can also be obtained with remote pair programming [2]. Working with peers in class also has social, community and employability benefits. In contrast, students working online largely learn unaccompanied and may miss the benefits of peer interaction. We investigated the question: "Can we replicate all the benefits of face-to-face pair programming online?" In a pilot project, a small number of students used Adobe Connect for Remote Pair Programming (RPP). Results indicated an increase in: ability to work in a team, confidence in solving problems, sensitivity in communication with others, initiative and self-assessment [3].

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Learning can take place through observing others, as well as active participation [4]. In the full study we compared the relative benefits of observation or active participation in RPP.

2 OVERVIEW

Forty students participated in three activities: 1) watching a recording of tutors pair programming; 2) watching a live demonstration of RPP; 3) participating in RPP with a student partner. Students then completed questionnaires about their attitudes to social and employability benefits such as problem solving, communication, collaboration, and decision-making. Eight of ten questions showed positive significant differences between active RPP and passive observations. Self-reflection and the value of peer learning did *not* differ significantly. This will be explored further via focus groups.

A second study used a commercial RPP tool. Despite difficulties with regular sessions (employment/family commitments and technical problems), most students 'gelled' with their partner after two sessions. RPP improved their coding and debugging skills and confidence. Responses to whether RPP improved their time management or study skills varied. We have now started a larger study with 120 students from two different modules.

3 CONTRIBUTIONS

Our studies suggest that remote pair programming enhances the student experience for distance online learners, although there are technological and other barriers. This is timely given present circumstances that dictate a move from face-to-face to online university teaching.

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