

Open Research Online

The Open University's repository of research publications and other research outputs

Remote Pair Programming

Conference or Workshop Item

How to cite:

Adeliyi, Adeola; Hughes, Janet; Kear, Karen; Law, Bobby; Murphy, Brendan; Rosewell, Jon; Walshe, Ann and Wermelinger, Michel (2021). Remote Pair Programming. In: Proceedings of the SIGCSE Technical Symposium, ACM.

For guidance on citations see [FAQs](#).

© [not recorded]



<https://creativecommons.org/licenses/by-nc-nd/4.0/>

Version: Accepted Manuscript

Link(s) to article on publisher's website:

<http://dx.doi.org/doi:10.1145/3408877.3439681>

<https://sigcse2021.sigcse.org/>

Copyright and Moral Rights for the articles on this site are retained by the individual authors and/or other copyright owners. For more information on Open Research Online's data [policy](#) on reuse of materials please consult the policies page.

oro.open.ac.uk

Remote Pair Programming

Adeola Adeliyi, Janet Hughes, Karen Kear, Bobby Law,
Brendan Murphy, Jon Rosewell, Ann Walshe, Michel Wermelinger
School of Computing & Communications, The Open University, Walton Hall, Milton Keynes MK7 6AA UK
{Adeola.Adeliyi, Janet.Hughes, Karen.Kear, R.Law,
B.Murphy, Jon.Rosewell, Ann.Walshe, Michel.Wermelinger}@open.ac.uk

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].

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the Owner/Author.

SIGCSE '21, March 13–20, 2021, Virtual Event, USA.

© 2021 Copyright is held by the owner/author(s).

ACM ISBN 978-1-4503-8062-1/21/03.

DOI: <https://doi.org/10.1145/3408877.3439681>

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.

ACKNOWLEDGMENTS

We thank student and staff participants, and eSTeEM, the Open University's Centre for STEM Pedagogy, for funding support.

REFERENCES

- [1] Laurie Murphy, Kenneth Blaha, Tammy VanDeGrift, Seven Wolfman, and Carol Zander. 2002. Active and cooperative learning techniques for the computer science classroom. *J. Comput. Sci. Coll.* 18, 2 (Dec., 2002), 92–94.
- [2] Nick Z. Zacharis. 2010. Measuring the Effects of Virtual Pair Programming in an Introductory Programming Java Course. *IEEE Transactions on Education* 54, 1 (May, 2010), 168–170.
- [3] Janet Hughes, Ann Walshe, Bobby Law, Brendan Murphy. 2020. Remote Pair Programming. In *12th. International Conference on Computer Supported Education, CSEDU '20*, SciTePress, 476–483.
- [4] Michelene T.H. Chi, Marguerite Roy and Robert G.M. Hausmann. 2008. Observing tutorial dialogues collaboratively: insights about human tutoring effectiveness from vicarious learning. *Cognitive Science* 32, 2 (March 2008) 301–341.