

Let's Code!

Teaching Pre-University Students Coding Using a Blended Learning Approach

Mok Heng Ngee and Vandana R. Rao

KEY IMPLICATIONS

- A 3-week basic programming course focusing on problem solving was designed and delivered in blended learning style. This course ran four times in 2016 to 2017.
- A total of 535 pre-university students – most of whom had never coded before – enrolled in one of the runs and 80.6% of these participants completed the course successfully.
- This project forms a case study of how such courses can be delivered effectively using blended learning. Best practices and pedagogical experience gained from this project were presented at two peer-reviewed conferences in 2018.

BACKGROUND

Although most pre-university students are skilled technology consumers, most are not formally trained as technology creators. “Computing” is not commonly taken as a subject at the “O” and “A”-level examinations, and except for students in computer clubs, most have never written a real programme before.

One objective of this project was to introduce programming to pre-university students in an intensive 3-week course held during the school holidays, and possibly open the doors to a computing-related university course and

subsequent career. The “entry barrier” for learning programming is relatively low: self-learners do not have to invest in special equipment or require a laboratory in order to pick up programming. All they need is a laptop and an Internet connection to enrol in one of the several free online courses (such as massive open online courses [MOOCs]) that cover introductory programming. However, MOOCs are known to suffer from extremely high dropout rates.

The second objective of this project is to deliver this programming course in an effective and engaging manner so as to maintain a low attrition rate. Unlike most MOOCs which are delivered entirely online, this course adopts the blended learning pedagogy. The seven meet-up sessions which supplement the online components are designed to improve interaction, increase learning effectiveness, and result in higher motivation to complete the course.

FOCUS OF STUDY

Besides being a case study for using blended learning to teach a short computing course, feedback from earlier runs are used to refine subsequent runs of the course. Best practices are documented as a contribution to the existing literature on blended learning and teaching programming.

KEY FINDINGS

A total of 34.8% of the respondents to the end-of-course survey implied that they were more likely to consider a career or university program in an IT/computing-related discipline after their course experience (Mok, 2018; Ramachandra, 2018). 17.2% reported that they were less likely to do so. These figures can imply that this project has met its objective of positively influencing participants into the IT/computing discipline. The project had definitely exposed all participants to programming, including those who were negatively influenced.

Changes made to later runs of the course based on feedback from participants and mentors were documented in the conference papers, together with rationales for the modifications. They include emphasis on setting the expected time commitments for participants, allocation of two mentors (instead of one) to each participant, providing screencasts to illustrate different ways to solve sample assignment problems, placing “friends” together in the same teams, using an “open-ended” project question in the last assignment to increase motivation for self-exploration, and using a simple dashboard to monitor participants’ progress.

SIGNIFICANCE OF FINDINGS

This project and the best practices documented serve as recommendations for teaching practitioners who are designing similar short courses using blended learning.

PARTICIPANTS

A total of 535 participants from a total of 24 pre-university institutions enrolled for the course; 77.8% of these participants had never written a program prior to their registration. Most of them (45.4%) were in their second year of junior college; 52.2% and 47.8% were male and female students respectively.

RESEARCH DESIGN

In order to assess the learning acquired through the course, a short pre-test to determine programming proficiency was administered to participants during the first meet-up session. A similar post-test was administered during the final meet-up session at the end of the three weeks. The score differences gave an indication of the content mastery acquired as a result of the intervention (attending the course). An end-of-course feedback survey was also administered to identify issues and gaps.

REFERENCES

- Mok, H. N., & Rao, V. (2018, April). *Introducing basic programming to pre-university students: A successful initiative in Singapore*. 17th International Conference on Information Technology Based Higher Education and Training (ITHET), Portugal.
- Ramachandra, R. V., & Mok, H. N. (2018, September). *Teaching basic programming to pre-university students through blended learning pedagogy – a descriptive study*. 12th International Symposium on Advances in Technology Education (ISATE), Hong Kong.

About the authors

MOK Heng Ngee and Vandana R. RAO are with the Singapore Management University, Singapore.

Contact Mok Heng Ngee at mok@ieee.org for more information about the project.

This brief was based on the project AFD 02/15 MHN: Let’s Code! Teaching Pre-University Students Coding Using a Blended Learning Approach.

How to cite this publication

Mok, H. N., & Rao, V. R. (2019). *Let’s Code!: Teaching Pre-University Students Coding Using a Blended Learning Approach* (NIE Research Brief Series No. 19-010). Singapore: National Institute of Education.

Request for more details

Please approach the Office of Education Research, National Institute of Education, Singapore to obtain a copy of the final report.

>> More information about our research centres and publications can be found at: <http://www.nie.edu.sg>