













assignment rounds. This difference can be attributed to the collaboration between students. The pair working seems to have positive effect on students' activities.

There was no pre-test in the research. However, the sample size in the research data was over 70 students, and therefore the pre-test was not needed to prove the results. Nevertheless, a pre-test could improve the reliability of the study. Additionally, pairs could have been assigned randomly to further improve the reliability and validity of this study.

## 6. Conclusion and future work

The goal of this paper was to analyse the effect of collaborative testing with the e-assessment tool ViLLE on students' success in the Financing Mathematics exams. This study confirmed the effect: students working in pairs attain better grades.

We compared the exams' grades and the exam success rates of students working independently and in pairs with ViLLE. We also compared the ratio of the assignments completed by the student groups. We also analysed how the gender and students' home country affected success in exams.

The amount of assignment work completed seems to be the key reason for the better success of the pair working students. This may be attributed to the collaboration between students which is stimulated with the use of the ViLLE tool.

Based on this paper we can summarise the key benefits of collaborative work with educational tools:

- Pair work improves the learning of Financing Mathematics.
- Pass and participations rates of students are improved because of pair working.
- The gender or nationality seems not to have an effect to results. Instead, students benefits of the working in pairs independent of gender or nationality.

Pedagogical aspects relating to the educational tools were not considered in detail during this study. Instead the main focus was on the usage of the ViLLE tool with assessment. Therefore, it would be interesting to analyse the effect of pedagogy on, for instance, additional teacher's personal coaching and guidance effects compared to the feedback students receive only by the tools: It would be interesting to investigate whether there are any significant difference of students' learning results when the feedback and guidance is provided by the ViLLE tool and by the teacher, or ViLLE only.

It would be also interesting to carry out more research into the effect of collaborative work with the different group sizes and verify how the students' initial ability levels affect the learning results.

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