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## Peer learning in higher education: An effective response to the university students' dropout problem

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The process of globalisation has shown that countries can play a key role on the international stage provided that their citizens are given the opportunity to build a significant background in science, technology, engineering and mathematics (STEM). One of the critical issues regarding the low number of degrees in STEM faculties is the considerable dropout rate in the first years of higher education. In this context, Italy is no exception with about 20% of its university students who drop out within the first two academic years. In a recent study based on administrative data from the Italian Politecnico di Milano, it has been pointed out that the most important factor which allows to predict Politecnico di Milano student dropout is the number of university educational credits gained across the first term of the first academic year. Since active methods employed in academic courses appear to enhance students' learning more than traditional lectures even in the context of large size classes, their use could lead to a decrease in the dropout rate. In the academic year 2021-2022 we carried out a case study which involved about two hundred freshmen attending the "Fisica Sperimentale A+B" course at Politecnico di Milano. In addition to traditional lectures and drills, seven peer learning sessions were offered to these students. During each peer learning session, the learners answered a questionnaire consisting of three multiple choice items based on some Physics topics and whose provision was implemented by using the students' response system Socrative. Immediately after the questionnaire, freshmen in the classroom would discuss the quizzes in small groups for few minutes. At the end of this debate, they retook the same questionnaire. Finally, the instructor briefly illustrated the correct as well as the incorrect alternatives of each item and the percentage of answers ascribed to each possible option were shown to the students. Considering that some students attended that course in person while others attended the lessons on line, we had both an experimental and a control group. Their initial knowledge in Physics was checked and compared through a questionnaire. This instrument was administered at the beginning of the academic course and based on multiple choice items on some Physics topics which were completely different from the ones employed during the peer learning sessions. In order to evaluate the effectiveness of this education methodology, we examined the freshmen's achievement in their Physics course final examination during the first exam session. Our findings show that the success rate of the experimental group was higher than the control group and this difference was statistically significant. Moreover, the calculated effect size highlighted that the association between the final examination pass rate and the peer learning sessions attendance was relatively strong. Furthermore, we investigated the possible correlation between the final examination pass rate and the number of peer learning sessions attended by the students. On balance, these results appear to confirm that our innovative educational methodology may be effective in the mitigation of the university students' dropout rate.

### Research Strand

University Education

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