



A Study on the Reintroduction of Logic in Secondary Schools

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Abstract

In the 1970's heyday of New Mathematics in Flanders the focus in mathematics education was laid on the internal structure of pure mathematics. Logic formed a part of the curriculum. In the decades that followed, mathematics education has changed a lot and logic is no longer taught now. However, there are still a lot of mathematics teachers that favour the idea of teaching logic in secondary mathematics classes. Moreover, the rise of IT makes the topic even more important.

We believe that logic should be reintroduced in the mathematics curriculum. It is not just the link with mathematical proofs that is so important, but also the ability to reason logically in everyday life and the importance of logic in further education (e.g. IT, mathematics, philosophy...).

In general, literature shows that a lot of students have difficulties in understanding certain aspects of logic, e.g. implications, the law of contrapositive, proof by contradiction and negation of statements with quantifiers. Lin, Lee and Yu in [1] found that about 80% of the 202 students of 17-20 years olds in their study were not able to negate the quantifier 'only one' and that more than 70% did not have conceptual understanding of proof by contradiction. However, the study also showed that it is possible to help students to understand the concept of proof by contradiction and apply it in real world situations.

In our study, we investigate the possibility to make logic more easily accessible to students in secondary school within the framework of math classes and we want to explore students' opinions about logic. Do they think it is helpful for mathematics? And how about everyday life? Do they expect it to be useful during their further education? In collaboration with math teachers we developed a series of lessons and course material on propositional and predicate logic for secondary education which focus on logic in everyday life and logic for mathematics. The students can learn the lessons autonomous but other teaching methods can also be applied.

In our study, three different secondary schools and about fifty students are involved. Our research is based on observations during the courses and a questionnaire at the end. In this paper we report on the first results of our study.

References

- [1] Lin. F.L., Lee. Y.S. & Wu. J.Y. (2003). Students' understanding of proof by contradiction. In N.A. Pateman, B.J. Dougherty, J.T. Zilliox, (Eds.) *Proceedings of the 27th Conference of the International Group for the Psychology of Mathematics Education* (Vol. 4, pp. 443-450). Honolulu, Hawaii: University of Hawaii.