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Selection and use of resources by first year students to study mathematics

We present the results of a study in which we investigated how first-year mathematics/engineering students selected and used the resources on offer for their learning of Calculus (offered at three levels, A, B, and C) and Linear Algebra, and retrospectively the resources they used at school. In the study we used a mixed-methods approach with individual interviews, focus group interviews, and surveys. Results showed that (1) At the start of university, students often relied on their high school knowledge and use of traditional curriculum resources (e.g. textbook). However, students also changed their practices at university, due to the demands of the university courses and the plethora of available resources. (2) This led to many students developing their own orchestration of resources, which yielded in individual actual student learning/study paths, in which different kinds of resources were included (e.g. social; curriculum; own identified). (3) The selection of resources differed between the Calculus courses and Linear Algebra. In the Linear Algebra course the students could follow the designed study path, with the relevant resources lined up accordingly. In one of the large Calculus courses the interviewed students found it harder to identify clear study paths, and had to find their own ways of managing the large number of learning supports on offer for passing their examinations. Hence, the course organization had an influence on students' use and selection of resources. (4) The analysis of the survey allowed us to identify three clusters of students, which to some extent supported the qualitative results. (5) Comparison of one lecturer's Calculus class in two consecutive years showed that there were shifts in both the perceived relative importance and reported frequency of the use of particular resources. In terms of implications for practice, we suggest that lecturers need to consider particular learning trajectories for their course design, in particular when a large number of resources are offered. Moreover, students might need to be educated how to select and develop productive learning paths aligned with the relevant resources, in order to grow with and finally enjoy these early mathematics experiences.

CV

- Education: mechanical engineering (Technical University Delft, 1988); Higher Education Diploma (UNISA); MEd natuurkunde (Fontys Lerarenopleiding Tilburg)
- Positions in the commercial sector: instrument engineer, IT consultant, product specialist.
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- Since 2017 working as a part-time postdoc with Birgit Pepin at the Eindhoven School of Education and since 2007 as a teacher educator and coordinator of the MEd in physics education at Fontys University of Applied Sciences in Tilburg.
- Research interests include the use of resources to study mathematics, mobile learning, STE(A)M education, and design research.