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Engineers of the future: Integrating professional competences via PAL

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Abstract

Higher education institutions increasingly acknowledge their responsibility to guide students, both in their career development and academic growth (Burke, Scurry, Blenkinsopp & Graley, 2017; National Academy of Engineering. 2018), so recognising the impact of (co-)curricular activities on professional competences is crucial (Kinoshita, Young & Knight. 2015). This research looks into the students' perspective on the development of professional competences as a Peer Assisted Learning (PAL) tutor. In total, 27 tutors participated in the PAL programme of the Faculty of Engineering Technology (FET), KU Leuven (Belgium). The process included didactic and pedagogical training which prepared the tutors for their educational tasks. Via intermediate and final group discussions, hindrances and opportunities were discussed and tackled. Finally, an online individual questionnaire shed light on the competences indicated. Tutors and tutees indicated many benefits of PAL for their learning activities, such as fostering the ability to communicate clearly and cooperate better. To conclude, we need to keep giving students the possibility to develop their competences via different types of (co-)curricular activity to ensure student involvement and maintain high-quality education.

1 Introduction

Several authors stress the importance of integrating professional competences into the curriculum, but this requires time (National Academy of Engineering, 2004; Male, 2010). In addition, engineering programmes struggle to give students room to develop professional competences and professional identities (National Academy of Engineering, 2004). Educational institutions also have a responsibility to prepare students to engage in a more self-regulated way of learning. The need to develop specific learning competences could be answered by involving peers in the learning process (Berghmans, Dochy & Struyven, 2009), for example in co-curricular activities as Peer Assisted Learning (PAL). This concept implies the development of knowledge and skills through active support by peers to make sure learning goals have been reached (Berghmans, Dochy & Struyven, 2009).

A broad range of benefits of PAL, for both tutors and tutees, have been reported in many studies. These include cognitive gains, higher involvement, creation of a safe learning environment with lower thresholds and the stimulation of students' self-confidence (Berghmans, Dochy & Struyven, 2009; Ray & Ray, 2012). The FET launched a pilot project in

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academic year 2019-2020 to look into the perspective of students on the development of professional competences as a PAL tutor. Six courses on four campuses participated in the pilot, which resulted in a total of 27 tutors and 97 first-year tutees.

2 Method

Via three consecutive components (selection, training and assessments), we were able to identify, train and assess the competences of a potential PAL tutor.

2.1 Selection

Selection of potential tutors is based on a face-to-face interview conducted by the didactic team. Here, disciplinary and pedagogical knowledge is tested via cases such as "self-authorship" (testing loyalty, team player and technical and communication competences). The intention of this short interview is to (1) gain a first impression of the competences acquired; and (2) identify the motivation of the tutor. Finally, the didactic team chose the most suitable candidates.

2.2 Training

The selected tutors attend a (two-hour) hands-on training session given by the pedagogical trainer and someone from the didactic team. The session is based on didactic skills (e.g. future-ready teaching methods), course content, and pedagogical aspects. Tutors engaged in different types of exercise, such as role-plays, scenarios, and individual assignments. The pedagogical trainer used activating and interactive teaching methods which the tutors could use during their own teaching assignments. The teacher was responsible for the course-content-related information.

The literature states that there are three types of tutor (Berghmans, Neckebroeck, Dochy & Struyven, 2013; De Smet, Van Keer & Valcke, 2008):

1. Motivational organisers or motivators: tutors who stimulate and motivate tutees to participate via structural-organizational strategies and support
2. Knowledge constructors of questioners: tutors who concentrate on questioning tutees by stimulation and facilitation
3. Informers: tutors who mainly give information, transmit and illustrate their knowledge in a direct manner by providing specific answers to their questions

During PAL training we focused on stimulating tutor types 1 and 2, because we believe that a combination of these profiles is crucial. The study by Bulte et al. 2007 shows that a tutor has three roles: information provider, role model and facilitator (Bulte, Betts, Garner & Durning, 2007)

Eventually, tutors will be able to (1) handle practical and content-related issues during PAL sessions; and (2) reflect on certain competences.

2.3 Assessment of competences

17 out of 27 tutors participated in the assessment of the competences, in two steps:

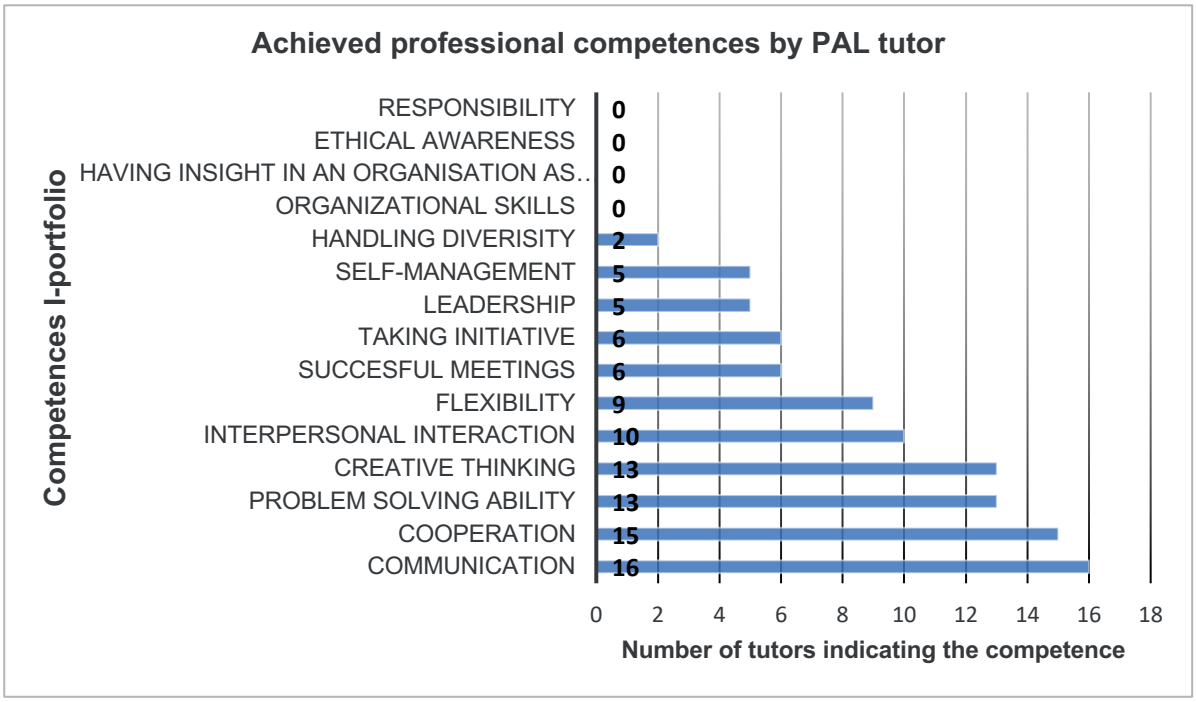
1. During two focus group discussions with the teacher, the tutors received feedback on PAL (process, sessions), experience and trained competences.
2. Via an individual online questionnaire (I-portfolio) the tutors indicated, via self-perceptions, the competences they had improved and explained in detail the difficulties or successes they had had. Afterwards the teacher provided feedback, if asked.

3 Outcomes of the assessments

3.1 Focus group discussion

17 tutors participated in an intermediate and final focus group discussion with the teacher. The tutors indicated that they had made the most progress in coaching skills, didactic skills, analytical skills, presentation skills, clear communicating, motivating and activating peers. The tutors also indicated that they were able to explain matters better (i.e. they went from questioner to informer and motivator). Finally, they were also able to empathize with how other students approached a problem.

3.2 I-portfolio



The statements given during the focus group discussions were compared with the responses of the tutors in their I-portfolios. The following competences were mentioned the most: communication (n=16); collaboration (n=15); problem-solving ability (n=13); and creative thinking (n=13).

4 Discussion

In both assessments, PAL tutors indicated that they had developed communication skills, cooperation skills and the ability to solve problems in a flexible and creative manner. As the study of Bulte C et al. 2007 explains, teaching tutees can have a positive effect on facilitation and communication skills (Bulte, Betts, Garner & Durning, 2007).

This exploratory study shows that tutors benefit from PAL and that they were able to reflect on their competences in various stages of the process. Nevertheless, we need to give tutors the opportunity to explore and strengthen their professional competences even more.

Some skills, such as responsibility and organizational skills, were not highlighted as achieved competences in the assessments, even though these skills are also crucial for engineers (Kinoshita, Young & Knight, 2015; Male, 2010). From the tutees' point of view, they were (N=35) satisfied with the PAL support, but they mentioned that the content knowledge and

professional competences of the tutors could be improved. The tutees felt that the roles of tutors are as facilitators and assessors (Ningrum, 2018).

5 Limitations

- The competences were not assessed prior to the PAL activities.
- We do not know the reasons why they indicated a certain competence (e.g. they do not understand the meaning of the competence, they do not know when they can indicate a certain competence, etc.).
- We also worked with the competences in the I-portfolio, which might deviate from the competences indicated in literature studies.

6 Future research

In the near future, we will develop pre- and post-tests to measure tutors' competences before they start as tutors and at the end of the semester. The indication of and growth in competences are based on self-reflection and self-regulated skills. Self-regulated learning (SRL) is viewed as a proactive process that students use to acquire academic skills (e.g. self-monitoring one's effectiveness) and is also important in social forms of learning such as PAL. (Zimmeran, 2008). We will also conduct personal interviews to analyse self-regulation and competence identification in depth.

We would also like to examine using this option for Student Assistants (SA: students paid to conduct an educational task) and explore the similarities and differences between PAL and SA.

7 Conclusion

This paper shows that PAL offers advantages for tutors and tutees but that some improvements concerning (the level of) some competences are crucial. Further research will give more insight into the identification of competences and will help faculty to upgrade this peer-support programme. Keeping future-ready education in mind, we need to keep giving students the possibility to develop their competences via different types of (co-)curricular activity to ensure student involvement and maintain high-quality education.

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