Maastricht University

Growing knowledge

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Valorization

Through this dissertation, we have aimed to provide insight into how to support (bio) medical students' self-regulated learning (SRL) in a problem-based learning (PBL) curriculum. Research indicates that students often experience problems regarding the application of effective learning strategies for their studies (Kornell & Bjork, 2007), which negatively impacts their academic performance and long-term retention of the subject matter (e.g., Rawson, Dunlosky, & Sciartelli, 2013). As such, students need to be supported in their knowledge and use of effective learning strategies. This support does not only have a positive impact on students themselves, but can also have benefits for different groups of stakeholders such as educational institutes and patients. These benefits are outlined below.

Students

The most immediate group of beneficiaries consists of (bio)medical students themselves, for whom we have attempted to lay the foundation for the development and use of effective learning strategies. It is important for students to use appropriate strategies in order to optimize their academic performance and to retain their knowledge for their future work as health care professionals.

One of the recommendations following from this dissertation is that students should make explicit the perceptions and expectations they have about learning in (problem-based) higher education, and think critically about how their own expectations do or do not align with the expectations from their educational institute. Where possible, students should actively search for information about this, and adjust their expectations where necessary.

A second recommendation for students that follows from this dissertation, is that students should realize that the use of effective learning strategies costs effort. It is this effort, however, that makes the strategies effective for retaining knowledge for the long term. It might require a shift in mindset for students to realize and accept this reality, and proper support will be required. At Maastricht university, several of our colleagues are working on initiatives to provide this support, such as the Study Smart training provided to students in the first year of their bachelor program, which focuses on students' knowledge about and use of effective strategies and desirable difficulties while learning (Biwer, oude Egbrink, Aalten, & de Bruin, in press). Interestingly, this initiative reaches further than the (bio)medical programs of the university, and has been implemented in programs such as Psychology and Law, underscoring the applicability of the results from this dissertation to students in other study programs as well.

Educational institutes

From universities' perspectives, the results from this dissertation can be used to draw up guidelines for the development of a learning environment that will optimally support students' SRL development. Examples include the development of a curriculum that is conducive to the development of students' general academic competencies (such as competencies related to communication, organization and research), in which expectations about students' role in their own learning process are made explicit.

Further, it is recommended that universities take steps to relieve uncertainty about loss of control of the learning process in both students and teachers, and several suggestions for organizational changes and faculty development followed from this dissertation. These suggestions include changes to be made in the way that courses are evaluated, as well as faculty development aimed at educating teachers on how best to support students' SRL development. Furthermore, education on information literacy for students should be integrated throughout the curriculum.

It is important that universities make an effort to provide a learning environment fit for students' SRL development, in order to avoid an unnecessary financial burden associated with student dropout or study delays (Foo et al., 2018). Furthermore, health professions education programs have a responsibility to deliver competent health care professionals fit for practice (Lindgren & Karle, 2011), which further underscores the need for enabling students to develop learning strategies that allow long-term retention of (medical) knowledge and skills.

One of the premises in this dissertation was that students' unrealistic expectations about their learning environment, might influence their willingness and ability to engage in SRL. As such, a fruitful basis for SRL could already be created in primary and secondary education, in order to properly prepare students for learning in tertiary education. As such, recommendations apply not only to higher education institutions, but also extend to primary and secondary education. Specifically, primary and secondary education institutions should already include the development of SRL into their curricula, e.g. by teaching students information literacy skills, and by slowly granting them more control and responsibility over their own learning. In these settings as well, faculty development is required in order to properly support teachers in this role.

In the Netherlands, health professions education does not only take place on a university level. Health professionals (e.g., nurses, paramedics) are trained at the levels of senior vocational education and universities of applied sciences. These settings provide different degrees of autonomy for students to take control of their learning process, and as such afford different opportunities for students to develop their SRL skills. A recommendation for further research would be to investigate how the results found in the current study would be transferrable to education in these settings.

Lifelong learning and patient care

As described above, educational institutes are responsible and accountable for delivering competent health care professionals, where the patients' and societal needs are properly addressed (Lindgren & Karle, 2011). Results from this dissertation indicate that students are motivated by the prospect of becoming a competent health professional. First and perhaps most obviously, patients will benefit from a health professional who has retained his/her medical knowledge throughout the years and has acquired a deep understanding of the medical profession. However, as indicated at several points throughout this dissertation, learning does not stop at the end of the official curriculum, and students need to develop lifelong learning skills in order to keep up with a rapidly changing medical profession (Frankford, Patterson, & Konrad, 2000; Murdoch-Eaton & Whittle, 2012; Teunissen & Dornan, 2008) in order to (continue) to be able to provide safe patient care. As the development of lifelong learning skills depends heavily on students' ability to self-regulate their learning (Skinner et al., 2015), the guidelines provided in this dissertation could provide the foundation for this lifelong learning, and ultimately for continuing safe patient care.

Dissemination of results

Throughout the course of the project, results from the different studies have been presented at both national and international conferences. Examples include conferences from the 'Nederlandse Vereniging voor Medisch Onderwijs' (Dutch association for medical education, NVMO), the European Association for Research on Learning and Instruction (EARLI), and the American Educational Research Association (AERA). Several of the studies have been published in international, peer-reviewed journals. Over the next period of time, we will direct our efforts towards dissemination of the results from the final study (Chapter 5), both by presentations at conferences and by publication of the results in a peer-reviewed journal.

Furthermore, results and implications from the research are shared with more general audiences, including teachers at various levels of education. In 2018, the Open University of the Netherlands organized a conference in trends in education aimed at teachers and researchers, at which the results from the study described in Chapter 2 were shared and discussed with teaching professionals and students. Finally, as described above, results from this dissertation provided a basis for follow-up initiatives by colleagues, such as the Study Smart initiative by Biwer et al. (in press), which will be implemented and shared by the respective researchers.

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