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SHE Research Program

Task-Centered Learning Environments in the Health Professions
Faculty of Health, Medicine and Life Sciences
Maastricht University Medical Centre (MUMC+)



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Summary

Task-Centered Learning Environments in the Health Professions

The School of Health Professions Education (SHE) is a graduate school for research, education and innovation in the health professions education domain. Research on education is crucial to increase our understanding about how to optimally educate health professionals in order to prepare them for the delivery of high-quality care within the dynamic context of the healthcare setting and to support innovations in education. Current instructional design approaches emphasize the importance of using task-centered learning environments within training programs, in which learners either work on professional tasks in the clinical workplace or on learning tasks based on professional problems in the educational institute.

Task-centered learning environments better prepare learners for their future profession because these environments connect learning inside the educational institute to relevant professional situations outside the educational institute, often by integrating on-the-job and off-the-job learning. Within these environments, instruction and assessment are constructively aligned; that is, the learning tasks that learners work on provide information not only on learning, but also for feedback and assessment. The healthcare setting offers a unique and dynamic context for doing research on task-centered learning environments. Societal and technological developments are changing the role of the patient and the physician and bring new challenges to which the healthcare environment should adapt. In order to teach healthcare professionals to adapt to these new challenges in the workplace, it is key that their learning is situated in high-quality learning environments. Researchers in SHE conduct research on task-centered learning environments related to four main themes, specifically approaches to: (1) evaluation, (2) instruction, (3) assessment, and (4) implementation. The research is aimed at gaining a better understanding about which approaches work best for whom to reach specific goals or outcomes, under particular conditions.



Researchers in SHE conduct research on task-centered learning environments related to four main themes

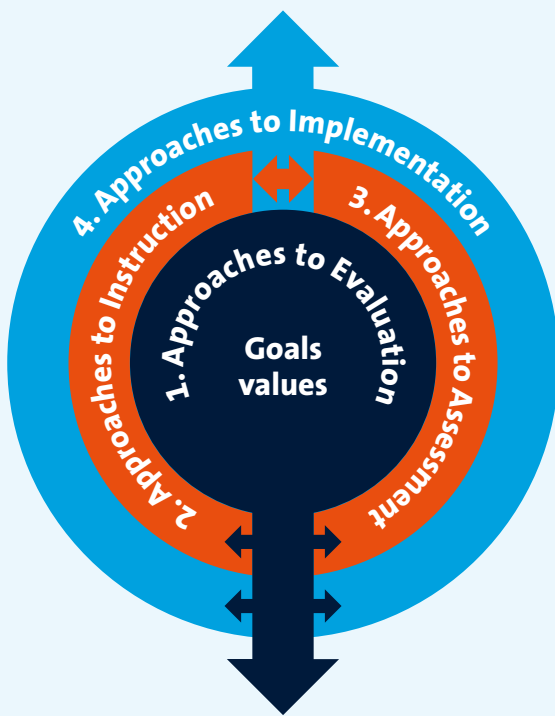
Questions being addressed include: How and under which conditions do approaches to evaluation promote or inhibit improvement of educational practice? How to involve and engage students, teachers, and other stakeholders as partners in evaluation approaches? To what extent do training programs support the implementation of innovations in healthcare? How to ensure that learners receive neither too much nor too little guidance? How to integrate domain-specific and generic competency acquisition? How can new technologies optimize learning? How to develop an assessment and feedback culture that enhances learning and high-stakes assessment for accountability purposes? How to interpret qualitative assessment data? How to take perceptions of all stakeholders into account in the implementation of educational innovations? How to take institutional, educational, and cultural values into account when implementing educational innovations worldwide? The research focuses on refining theoretical insights as well as on applying these theoretical insights in practice. It uses various methods that may help to answer relevant questions, ranging from qualitative and quantitative studies, through mixed-methods studies, to experimental studies and design-based research projects. We aspire to conduct high-quality research with the ultimate goal of providing a stepping stone to the improvement of health professions education worldwide, thereby helping raise the quality of healthcare.



Introduction

In task-centered learning environments, it is real-world problems or tasks that drive learning (Francom, 2017). In a professional, clinical setting the driving force for learning will typically be the professional tasks and situations learners encounter (Teunissen, 2015). In an educational setting, it may be problems (problem-based learning; Dolmans & Gijbels, 2013), projects (project-based learning), or other types of learning tasks based on real-life tasks (van Merriënboer & Kirschner, 2018). Task-centered learning environments aim to better connect learning inside the educational institute to relevant professional situations outside the educational

institute, often by integrating on-the-job and off-the-job learning. In this endeavor, one major challenge is to adequately balance the efficiency of adequate learner support and guidance with the effectiveness of centering learning on real-world learning tasks. The main aim of the SHE research program is to describe and analyze task-centered learning environments in the health professions; to investigate approaches to evaluation, instruction, and assessment in these environments; and to develop evidence-informed approaches to implementation in order to optimize task-centered learning environments.



Research themes SHE

The figure presents a schematic outline of the research program. The outer area indicates that healthcare is the context in which the vast majority of research takes place. Although the research program covers a variety of research topics on education, it mainly differs from other research programs on education in its strong focus on the health professions. The inner circle represents research on the *goals, values, and approaches to the evaluation* of learning environments in the health professions. The middle circle concerns research on approaches to instruction and assessment. These approaches aim to reach the goals and values specified in the inner circle, while carefully taking the contextual factors of healthcare in general and local settings in particular into account. Preferably, approaches to instruction and assessment are well aligned so that they are mutually reinforcing (Fastré et al., 2013). In a task-centered learning environment, it may happen that tasks are used for both instruction and assessment, even though assessment tasks often serve summative purposes. Indeed, in practice it may save time and effort to regard instruction and assessment as a single entity, however, from a research perspective, it is useful to make a distinction between approaches to instruction and assessment because it likely yields a more complete picture. The outer circle deals with research on the implementation of the approaches to evaluation, instruction, and assessment¹. The next sections will first describe healthcare as the context of the research program, and then discuss each of the circles in more detail.

Healthcare as a unique research context

The healthcare setting offers a unique and dynamic context for doing research on task-centered learning environments.

First, societal developments are changing the role of the patient. Patients are nowadays better equipped and take an active instead of a passive role. The focus of interest has shifted to achieving value for patients in healthcare. The narrow focus on diagnosis and treatment is gradually extended to also include the person behind the disease, or the patient's social environment and psychological and spiritual well-being. There is also an increased interest in involving patients in shared medical decision-making. Other societal developments bring new challenges as well, such as an aging patient population going hand in hand with multimorbidity, requiring teamwork and interdisciplinary collaboration among various professionals. These societal changes bring new challenges within patient care, research, and training (Maastricht UMC+, 2015).

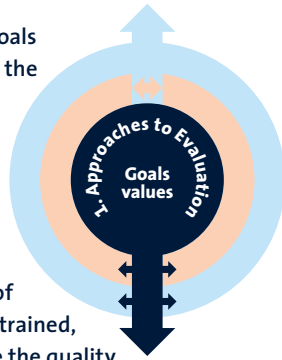
Second, technological advances will bring changes in healthcare. Such advances include new medical devices, robotics, telemedicine, big data and deep-learning applications, and many more. As a result, health problems will be detected earlier, new devices will become available and accessible for patients, media other than face-to-face meetings will be used in physician-patient communication, and so forth. Healthcare providers must keep up to date with all the new technological developments in their field and they must be able to support their patients in using these new technologies (i.e., care technology).

Third, societal developments will entail changes to the role of the physician. Physicians are no longer authorities but have to closely collaborate with patients and work toward creating partnerships with patients. Good healthcare should be provided in a physically and psychologically healthy work environment. The environment and the way it is organized and managed should help fulfill the basic needs of healthcare providers. They should be offered training opportunities to help them feel competent in a changing environment, granted autonomy and offered support to further develop their competencies, and be enabled to feel related to other physicians and learn from their peers. Finally, they should receive support to develop the skills that allow them to balance work, family, and their personal needs within this dynamic and ever-changing environment.



Research theme 1: Goals, values, and approaches to evaluation

The first theme focuses on the goals and values of and approaches to the evaluation of health professions education. Health professions education aims to train healthcare professionals to contribute to excellent care within the dynamic context of healthcare. This requires an understanding of which competences can best be trained, how education can help improve the quality of care, and how health professions education can best be evaluated.



One of the important foci in health professions education research is on defining which competencies can best be trained. Health professions education should embody the values of healthcare, as reflected in the CanMEDS roles (Frank, Snell, & Sherbino, 2015) which specify that a medical expert should not only acquire content expertise, but also learn to communicate, collaborate, manage, et cetera. Excellent healthcare requires all-round professionals who have acquired both domain-specific and generic competencies. Domain-specific competencies are directly linked to a specific profession (e.g., of a nurse, dentist, medical doctor, physiotherapist, biomedical/health scientist, pharmacist, midwife, etc.). Generic competencies, or 21st century skills, however, refer to communication skills, collaboration skills, learning skills, creative-problem solving skills, etc. These generic competencies are also crucial as we need to prepare professionals for life-long learning so that they are able to flexibly adapt to the ever-changing healthcare context. The acquisition of domain-specific and generic competencies should be well balanced within health professions education training programs. Generic competencies are not directly linked to a domain although most researchers will argue that they can only be developed in one or more domains. Which competencies should be developed strongly depends on the values of various stakeholders in the field, such as patients and professionals working within the various care settings, teachers, students, educational designers, but also health insurers, relevant government bodies, policymakers and society at large (O'Sullivan et al., 2012; Al-Eraky, 2015). Both these domain-specific and generic competencies should be translated into intended learning outcomes or goals to be achieved in training programs.

Questions to be answered are: How can domain-specific and generic competencies best be balanced within training programs to achieve the intended goals or competencies? How can the key values of healthcare be translated into effective training programs according to the various stakeholders? How long should a program take to reach its goals? How can we develop more flexible training programs? At which stage should competencies be trained and which ones? And to what extent do these training programs contribute to a life-long learning mentality?

Health professions education geared toward improving healthcare practices and outcomes is essential, both now and in the future. It is expected that high-quality training, notably in post-graduate and continuous education, leads to better performance on the job and, consequently, to better clinical outcomes for patients (e.g., better patient safety, fewer complications, more accurate diagnoses, lower mortality rates, etc.) (De Feijter et al., 2013; Smirnova et al., 2017). In this way, research in health professions education can contribute to the interdisciplinary field of translational medicine because it enables healthcare providers to use new techniques and devices for the purpose of improving the healthcare system (i.e., prevention, diagnosis, and therapies).



Furthermore, the sustainability of healthcare depends on the extent to which healthcare professionals are able to provide care that is both of high value and cost-conscious (Stammen et al., 2015) and have acquired job-crafting skills and competencies to deal with the high demands and workload in the workplace. The purpose of future studies is therefore to investigate how we should define quality of education and quality of care, and how they can best be measured; why and how instruction and assessment enhance (or inhibit) patient care quality and safety; and to what extent training programs support implementation of innovations in healthcare.

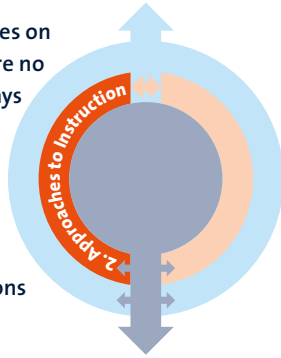
Evaluation of health professions education throughout the training continuum is another topic in health professions education research. Evaluation of education is nowadays aimed at achieving both accountability and improvement purposes, although continuous improvement and enhancement of education lie at its heart. Achievement of these purposes calls for five key practices: (1) providing our evaluation instruments and practices with a theoretical underpinning, by focusing on key input, process, and outcome variables based on evidence about effective learning and teaching at various levels (curriculum, course, student, teacher), (2) involving various internal and external stakeholders such as students, teachers, designers, researchers, alumni, accreditation organizations, employers, and patients (Stalmeijer et al., 2013, 2016), (3) combining multiple evaluative data and using mixed-methods approaches consistent with the principles of programmatic assessment, (4) monitoring evaluative data, reflection, and setting goals for improvement by means of dialogs with the stakeholders about the evaluative data (Van Lierop et al., 2017), and (5) creating a quality culture in which continuous quality enhancement is central (Kleijnen et al., 2014). Many institutions in higher education nowadays have systems or approaches to evaluate various aspects of their educational programs, but their effectiveness differs in practice. Questions to be answered are: How to enhance a quality culture? How to make teachers feel strongly committed to education and feel jointly responsible for the continuous improvement of education? How to encourage them to perceive giving and receiving feedback and evaluative data as beneficial for improvement? How to encourage both formal and informal collaboration on and communication about teaching and evaluative data (Kleijnen et al., 2014)? How to nurture the development of professional learning communities among students, teachers, designers, and researchers in which all stakeholders feel valued and empowered to enhance the development of a quality culture (Bendermacher et al., 2017)? How and under which conditions do approaches to evaluation promote or inhibit improvement of educational practice? How to involve and engage students, teachers, and other stakeholders as partners in the evaluation and redesign of training programs?



One of the important foci in health professions education research is on defining which competencies can best be trained. Health professions education should embody the values of healthcare.

Research theme 2: Approaches to instruction

The second research theme focuses on instruction. In education, there are no instructional approaches that always work: particular methods support particular goals under particular conditions. Thus, in order to develop evidence-informed design guidelines it is necessary to investigate specific combinations of methods, goals, and contexts.



Healthcare education in particular covers a great diversity of contexts, from classroom settings within medical schools, through public health information sessions provided in the community, to tertiary care hospitals and solo-practices in remote areas. It involves learners of all career stages whose learning goals differ widely. Therefore, in order to assess which approach works where, when, and why we need to gain a better understanding of these different contexts, the people involved, and their needs.

An advantage of a task-centered learning environment is that working on learning/professional tasks is a key element in almost all settings, which makes it possible to design educational programs that fully integrate workplace learning and learning in the educational institute. For example, Vandewaetere et al. (2015) described the design of a double-blended educational program for residents in family medicine. This program integrates not only face-to-face and online learning (the first blend), but also learning in clinical practice and in the online/face-to-face educational setting (the second blend). Another important condition pertains to the cultural and/or local setting. Methods and educational models that work in one place are not necessarily successful in another place. It could be argued, for instance, that in certain places where PBL has been adopted other approaches may have been more fruitful and that contextual differences have been overlooked or ignored (Frambach & Martimianakis, 2017). This underscores the importance of research that acknowledges such diversity and studies the effects of methods in different contexts (cultures, settings, target groups, etc.) and/or for different goals.

Instructional design models for task-centered learning environments include, amongst others, cognitive apprenticeship learning (CAL; Stalmeijer et al., 2013), first principles of instruction (Merrill, 2012), and four-component instructional design (4C/ID; van Merriënboer & Kirschner, 2018). The educational methods under study in these models are quite similar and include: (a) modeling, (b) guidance (in a broad

sense, including coaching, mentoring, and supervision), (c) reflection and types of cognitive feedback that elicit reflection, (d) articulation of -tacit- knowledge underlying task performance, and (e) exploration and guided discovery. Other methods explicitly deal with ordering of tasks, such as (f) scaffolding (i.e., gradually decreasing coaching, guidance), (g) sequencing (simple-to-complex, global before local, etc.), and (h) variability of tasks. A key question is always how to ensure that learners receive neither too much nor too little guidance, so that they feel both challenged and autonomous.

Research into domain-specific goals or competencies focuses on the development of specific guidelines for teaching medical image interpretation (Kok et al., 2017), clinical reasoning and decision-making (Durning et al., 2015, Diemers et al., 2015), and emergency skills (Dankbaar et al., 2014). Research on generic competencies, on the other hand, addresses the development of specific guidelines for teaching communication skills (van den Eertwegh et al., 2014), interprofessional skills (van Leijen-Zeelenberg, 2015), and self-regulated learning skills (de Bruin, Dunlosky, & Cavalcanti, 2017). Since the learning and teaching of domain-specific and generic competencies are always “nested,” the challenge is to answer the question of how to integrate the two: healthcare providers communicate with patients about domain-specific health issues; they bring in their own domain-specific expertise in interprofessional work, and they regulate their learning of domain-specific competencies. De Bruin and van Merriënboer (2017) propose to use the cue-utilization framework to achieve this integration when acquiring self-regulated learning skills: domain-specific learning processes yield more or less valid “cues” that in turn inform self-regulated learning skills.

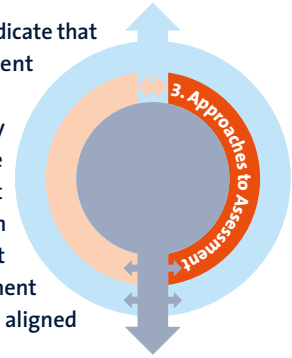
For all methods, decisions need to be made on the use of ICT and media, or multimedia. In a task-centered approach, a common model is the “flipped classroom” where theoretical information and example materials (e.g., video lectures, video modeling examples, and other learning resources) are made available online or in an “electronic study landscape,” so that precious face-to-face time can be devoted to working on learning tasks under the guidance of a tutor or supervisor. Learners can work on learning tasks in clinical practice or in a simulated task environment (which can also take the form of a serious game), ranging from paper-based problems or cases (“suppose you are a nurse and one of your patients shows the following symptoms: ...”), through virtual computer-based patients (Huwendiek et al., 2009) and standardized human patients in simulated settings (Tremblay et al., 2017), to real patients. Mobile devices are particularly useful to support learners who work on professional tasks in the clinical workplace (Könings et al., 2016). The possibilities of mobile devices, big data, and robotics for health are predicted to increase massively in the next decade or so, providing ample opportunity for educational research. Cognitive load theory (van Merriën-

boer & Sweller, 2010, Leppink et al., 2013) provides many guidelines for improving the effectiveness of multimedia-supported learning. Such knowledge may particularly benefit older learners, whose cognitive resources are especially challenged (Van Gerven, Paas, & Tabbers, 2006). Furthermore, multimedia may help to make learning more efficient and cost-effective, for example by providing online access to instructions, limiting the need to travel, or by accommodating students' needs through increased flexibility of instructions. In addition, increased autonomy and freedom to choose one's own individualized learning trajectory make learning more appealing and motivating (together with competence and relatedness, autonomy is seen as a precondition for intrinsic motivation in the Self Determination Theory; Ten Cate, Kusurkar, & Williams, 2011), as does the provision of learning analytics to help learners personalize their learning. Thus, a key question is how new technologies can be harnessed to make learning more effective, efficient, and appealing.

In addressing instructional approaches, particular attention is paid to the social aspects of task-centered learning. In an educational setting, task-centered educational models such as problem-based learning, project-based learning, and team-based learning typically divide learners into small groups and stress the importance of collaborative learning (Dolmans et al., 2005). Also in the clinical setting, cooperation with colleagues, learning from peers, and communities of practice are typically seen as essential elements of learning and professional development (Yardley, Teunissen, & Dornan, 2012). Collaboration serves at least three goals. First, it may promote learning processes such as prior-knowledge activation, elaboration, and reflection. Second, it may help learners to develop competencies such as shared decision-making, interprofessional teamwork, and leadership skills; nevertheless, however necessary, collaboration alone will not suffice to develop these social skills effectively; hence, explicit teaching remains key. Third, by cultivating an enhanced sense of connectedness, collaboration may increase motivation in learners and contribute to the development of a professional identity. A final key question is how to organize group work and collaboration in such a way that different goals are well balanced.

Research theme 3: Approaches to assessment

Research findings consistently indicate that assessment design and assessment practices always and inevitably need compromising, and that any single assessment is bound to be flawed. High-quality assessment therefore involves a combination of carefully selected assessment methods in a program of assessment that is fit for purpose - optimally aligned with assessment purposes.



Modern models of education require assessment systems that aim at optimizing summative as well as developmental assessment functions. The theory of programmatic assessment (Schuwirth & van der Vleuten, 2011; van der Vleuten et al., 2015, Van der Vleuten, 2016) is fully in line with competency-based or task-centered approaches to education and yields a type of student assessment that is constructively aligned with the educational goals and instruction described in the previous sections. In fact, programmatic assessment theory considers assessment design to be educational design.

Programmatic assessment implies a shift from assessment of learning to assessment for learning. The basic idea is that all learning and assessment tasks that learners work on provide not only information on learning processes and acquired competencies, that is, learners' strengths and weaknesses, but also suggestions for improvement. However, as neither one single task nor one single assessment can provide complete information on all relevant competencies, any single assessment task is to be considered low-stakes (i.e., no pass-fail decision attached). In programmatic assessment, high-stakes decision-making is to be based on multiple and meaningfully aggregated assessment data only. Thus, central to programmatic assessment is the notion that, in order to collect rich and meaningful information on where a learner stands and how his or her competencies develop over time, every single assessment task (data point) is to be optimized for learning and many tasks need to be assessed with a variety of assessment instruments. Although programmatic assessment theory pre-eminently pertains to competency-based education and task-centered learning environments, its principles can be applied to other contexts as well, including selection and admission, licensing and certification or recertification, and approaches to evaluation.

A key question, then, is how to design an assessment program that is truly "fit for purpose," managing conflicts and tensions that surface when combining multiple goals in complex

systems. Overarching and recurring questions will focus on which assessment approaches work best, for whom, and under which conditions. Research therefore aims at refining programmatic assessment theory, by exploring underlying assumptions (e.g., integration of assessment for and of learning; decision-making processes; multiple role mentoring) as well as factors affecting efficiency and effectiveness of programmatic assessment approaches across different contexts.

In programmatic assessment, provision of high-quality feedback and guidance to learners is the prime purpose of each individual data point. In order to achieve this purpose, assessment data must indicate to which extent the learner meets particular standards and provide informative feed up, feedback, and feed forward to support learners' performance improvement and development into competent professionals. If standards are not met and there is insufficient improvement over time, a diagnostic process is necessary to identify possible causes and to encourage and facilitate personalized remediation (van Merriënboer & Kirschner, 2018). From this perspective, conventional feedback in the form of pass/fail decisions or grades is a poor information carrier because it contains no information on how to improve (Govaerts & van der Vleuten, 2013). Moreover, students often ignore feedback that has a summative orientation (Harrison et al., 2013) and easily interpret feedback as summative if it is lacking clear suggestions on how to improve (Heeneman et al., 2015). Thus, we need a feedback culture that fosters a sense of psychological safety, enabling learners to pro-actively seek and accept feedback, and that motivates and empowers teachers/mentors to give rich feedback, preferably in such a way that learners can use this feedback to self-regulate their learning (Govaerts, 2015). Research, then, needs to address questions about what constitutes meaningful feedback, including questions about the role of the patient or patient outcomes in assessment systems in healthcare settings. Tensions between assessment for accountability and assessment for learning may furthermore raise questions about how to develop an assessment and feedback culture that enhances learning while meeting increasing pressures for educational and professional accountability.

With regard to the use of ICT, one type of application that seamlessly fits a programmatic approach to assessment is the electronic development portfolio. In such a portfolio, all the tasks that a student has performed and all assessment information are collected. It serves three functions: (1) it provides a repository of all tasks that a student has performed as well as of formal and informal assessment feedback and other learning results, (2) it facilitates the administrative and logistical aspects of the assessment process, and (3) it enables a quick overview of aggregated information such as overall feedback reports across sources of information (Driessen, 2017). ICT can also be used to strengthen the feedback process.



For example, progress testing has been implemented in most Dutch medical schools and yields information regarding the student's progress across the program in terms of medical knowledge acquisition: Learning analytics can then be used to give students both individualized feedback on their progress and advice as to which topics they need to restudy (Donkers, 2009). ICT can also help to make assessment more efficient and cost-effective. For example, adaptive progress testing can greatly reduce the time needed for testing and still fulfill its formative function (Muijtjens, 2014). Finally, ICT can give learners more autonomy, thereby making learning more appealing. For example, Spanjers et al. (2015) found that the availability of self-quizzes is an important moderator of the effectiveness of blended learning environments, probably because they help learners self-regulate their learning. Relevant questions thus address implications of rapidly and dramatically changing technologies (e.g., artificial intelligence; learner analytics) for assessment design and implementation.

Educational programs have to transform learners into graduates that are not only fit for today's healthcare practice, but also prepared to remain competent throughout their professional careers in unpredictably and rapidly changing work environments. From this perspective, task-based instruction and assessment need to pay attention to generic as well as domain-specific competency domains, covering all aspects of professional competence. Especially generic competencies or generic aspects of real-life task performance, which are often at stake when things go wrong in healthcare practice, are difficult to gauge with quantitative assessment instruments such as checklists. Rather, narrative expert judgments are required to prevent trivialization and to make assessments fulfill their informative function (van der Vleuten et al., 2015). With regard to conditions, work-based assessment faces somewhat other challenges than programmatic assessment in the educational institute. Within the educational institute educators can rely on a broad range of standardized assessment tasks for which assessment technology and theory are fairly well established. In work-based assessment, however,

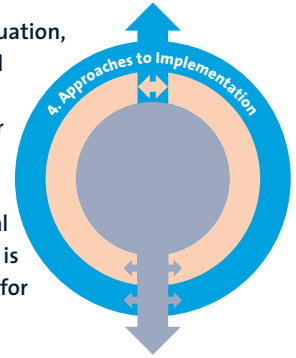
assessment tasks (i.e., professional tasks) are inherently unstandardized and interpretation of task performance is typically task- and context-dependent. Consequently, work-based performance assessments can only be understood “in situ” and are best viewed as socially situated interpretive acts (Govaerts & van der Vleuten, 2013). Important questions therefore address the refinement of theories on work-based assessment, but also examine meaningful interpretations of varied and differing assessment data; the role of qualitative assessment approaches (e.g., interpretation of narratives and the role of language in determining assessment outcomes), and cultural factors affecting effectiveness of assessment approaches.

Modern models of education require assessment systems that aim at optimizing summative as well as developmental assessment functions.

Finally, the strong focus of programmatic assessment on the formative function of assessment leaves open the question of how to organize summative assessment, that is, how to organize high-stakes assessments for making pass/fail and certification decisions. Such assessments must be based on many data points of rich information, that is, rest on broad sampling across situations, methods, and assessors (Driessen et al., 2012) and typically rely on human judgment. This calls for research focusing on the role of expert judgment in decision-making and on the design of assessment systems that support trustworthy decisions about a learner’s competence level. Relevant questions are related to the composition and functioning of assessment panels and to the standard setting as well as the structuring of assessment processes to ensure robust decision-making (e.g., portfolio requirements).

Research theme 4: Approaches to implementation

Research on approaches to evaluation, instruction, and assessment will provide insight into what will work best, for whom, and under which conditions. Yet, the implementation or realization of such approaches in educational programs or curricula in practice is never a straightforward process for at least two reasons.



First, the effects of approaches to evaluation, instruction, and assessment are always mediated by perceptions and expectations of students, teachers, and other stakeholders. Second, each local context will differ to some extent from the context in which the approach was developed and/or in which prior research was conducted, necessitating adaptation and contextualization or even a more fundamental rethinking of the approach. The key question that arises then is: What happens when educational approaches and innovations are implemented in practice? How can these be optimized to meet the expectations of different stakeholders and be integrated within existing educational and institutional structures and cultural dynamics?

With regard to the importance of expectations and perceptions, it should be clear that a new learning environment can only be successful when its underlying methods are not directly opposing student expectations and perceptions. Since students are more satisfied when a new environment lives up to their expectations and less satisfied when it does not, it is important to carefully prepare them for curricular changes (Könings et al., 2008). The same holds for teachers when they have to implement new educational approaches and innovations, especially when they were not involved in the design process. If new teaching methods are not carefully aligned with teachers’ expectations and perceptions, they will simply not use these methods or adjust them in such a way that they become more in line with their own beliefs. What complicates the situation even further is that educational innovations affect not only teachers and students, but also other stakeholders (e.g., designers, management, workplace supervisors, support staff) who may all have different expectations and perceptions. By involving the different stakeholders in the co-design of education, their different perspectives can be taken into account in the design, thereby contributing to optimal teaching and learning and helping achieve the intended learning outcomes or goals (Könings, Seidel, & van Merriënboer, 2014). One important research question is, therefore: How to take expectations and perceptions of all stakeholders into account in the design and implementation of educational innovations?



In this regard, educational change management theories stress the importance of co-creation and co-production, that is, the deep involvement of stakeholders in the innovation process. Co-creation or participatory design approaches are important in all different phases of this process, from the specification of educational goals and approaches, through the alignment of these approaches with physical learning spaces, to the realization of educational buildings - although different groups of stakeholders may be dominant in different phases of this process (Van Merriënboer et al., 2017; Dolmans & Tigelaar, 2012). Yet, in all phases students and teachers play a central role, preferably by creating student-staff partnerships as promoted in the CORE concept of Maastricht University (Collaborative Open Research Education; Maastricht University, 2016). Furthermore, in the context of globalization, educational institutions increasingly set up new education modalities in international contexts, such as cross-border curriculum partnerships, joint degree programs, and other forms of international collaboration, which offer new possibilities and opportunities, as well as challenges, for co-creation (Waterval et al., 2015). In cross-border curriculum partnerships, for example, co-creation with the international partner can apply to and benefit the educational programs at both the home and the host institution (Waterval et al., 2017). At the same time, however, intercultural communication and international collaboration in education have been noted as challenging and requiring thoughtful approaches (Waterval et al., 2017). An important question is, therefore: How to best organize participation and co-creation in different types of local and international educational innovation projects?

A key issue in the innovation and implementation of education is the professional development of teachers and educational management, which is an essential part of the strategy to involve all important stakeholders. Especially task-centered learning environments, which stress the multidisciplinary nature of professional tasks and the longitudinal development of competencies, call for strong educational leadership and management in order to monitor educational quality and provide educational support. Health professions educators need to be prepared for different roles, such as that of a member of multidisciplinary design and teaching teams, a tutor, supervisor, and student coach. The key to preparing them is to offer a faculty development program; that is, a coherent and flexible set of instructional formats and content that build upon each other, are closely related to various teaching roles, and can be flexibly adapted to the personal needs of a faculty member, including work on projects or innovations, and opportunities to practice in the workplace. In addition, professional learning communities should be created in which teachers continuously share and reflect on their teaching practices, develop a shared vision about teaching, mutually enhance their learning, coach each other, and build partnerships with other teachers, researchers, and students

A key issue in the innovation and implementation of education is the professional development of teachers and educational management.

(Steinert et al., 2016). This is where the circle closes: Teachers who work with their students in a task-centered learning environment are best trained in a task-centered learning environment themselves. Like their students, health professions educators learn foremost by working on meaningful and challenging tasks that help them develop necessary competencies, in an environment that fosters the establishment of formal and informal communities of learners (Schreurs, Huveneers & Dolmans, 2016). An important question is, therefore: How to design task-centered learning environments in ways that facilitate the training and development of health professions educators who teach and work in task-centered learning environments?

Besides involving stakeholders in educational innovation and implementation, it is crucial to take into account the existing institutional, educational, and cultural context in which the innovation is to be embedded. Institutional structures, as well as an organization's readiness for change, have a substantial influence on the success and uptake of an innovation, such as curriculum change (Jippes et al., 2013). Furthermore, educational practices, beliefs, and values differ between institutions, both nationally and internationally, which needs to be considered when implementing educational methods and innovations that were developed and investigated elsewhere (Frambach et al., 2012). Popular educational approaches and frameworks, such as PBL and competency-based medical education (CBME, e.g. the CanMEDS framework), have been adopted by many institutions around the world, resulting in successes as well as in problems and criticism (Frambach et al., 2017). Educational approaches inherently carry with them a set of values and beliefs that reflects the context in which they were originally developed. Awareness of the historical, political, and cultural origins of educational approaches will help determine how and to what extent the approach might be applicable to other settings, as well as how it might be adapted and contextualized. Simultaneously, such awareness can help in continuously rethinking and improving the approach by learning from how it has been applied or rejected in other settings and why. In sum, an important question is: How can and should institutional, educational, and cultural values and structures be taken into account when implementing educational innovations, and how can we share and learn from educational innovation worldwide?

Closing remarks

Four themes were described in this program: Research on the goals and values of and approaches to evaluation; research on approaches to instruction; research on approaches to assessment; and research on approaches to implementation.

In our description, we focused on interesting research questions to ask, not on the research methods that can be used to answer these questions. In terms of research methods, the program uses all methods that may help to answer relevant questions, ranging from descriptive-qualitative studies and experimental-quantitative studies, through narrative reviews and statistical meta-analyses, to short intervention studies and longitudinal design-based research projects. Yet, where possible, if at all, methods are combined (mixed methods, triangulation) to strengthen the reliability, reproducibility, validity, and trustworthiness of research findings.

It should be stressed that the research program described here emphasizes task-centered learning, which is learning by working on professional tasks in the clinical workplace or on learning tasks in the educational institute. These tasks, moreover, are based on professional tasks but take the form of problems, projects, or cases. The research program also addresses questions related to approaches to evaluation, instruction, assessment, and implementation of task-centered learning environments. It mainly differs from other research programs in educational sciences in its main focus on education in the health professions setting. It aims to answer questions that emerge in health professions education, and the answers in turn aim to positively influence health professions education. We aspire to conduct high-quality research with the ultimate goal of providing a stepping stone to the improvement of health professions education worldwide, thereby helping raise the quality of healthcare.



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