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Enhancing meaningful learning and self-efficacy through collaboration between dental hygienist and physiotherapist students – a scholarship project

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Johannsen A, Bolander-Laksov K, Bjurshammar N, Nordgren B, Fridén C, Hagströmer M. Enhancing meaningful learning and self-efficacy through collaboration between dental hygienist and physiotherapist students – a scholarship project.

Abstract: *Introduction:* Within the field of Dental Hygiene (DH) and Physiotherapy (PT), students are taught to use an evidence-based approach. Educators need to consider the nature of evidence-based practice from the perspective of content knowledge and learning strategies. Such effort to seek best available evidence and to apply a systematic and scholarly approach to teaching and learning is called scholarship of teaching and learning. *Objective:* To evaluate the application of the scholarship model including an evidence-based approach to enhance meaningful learning and self-efficacy among DH and PT students. *Methods:* Based on the research on student learning, three central theories were identified (constructivism, meaningful learning and self-efficacy). These were applied in our context to support learner engagement and the application of prior knowledge in a new situation. The DH students performed an oral health examination on the PT students, and the PT students performed an individual health test on the DH students; both groups used motivational interviewing. Documentation of student's learning experience was carried out through seminars and questionnaires. *Results:* The students were overall satisfied with the learning experience. Most appreciated are that it reflected a 'real' professional situation and that it also reinforced important learning from their seminars. *Conclusion:* The scholarship model made the teachers aware of the importance of evidence-based teaching. Furthermore, the indicators for meaningful learning and increased self-efficacy were high, and the students became more engaged by practising in a real situation, more aware of other health professions and reflected about tacit knowledge.

Key words: academic teaching; life-long learning; medical disciplines; practical skills

Introduction

Integrating theoretical knowledge in a practical context is often a tough task for students. Our experience as teachers in dental hygiene and physiotherapy is that clinical teachers in both programmes report that the students have forgotten knowledge that has been taught at an earlier stage in the educational programme. This seems to be the case also for other students in the medical field (1). Further, course evaluations from several

years in the two programmes show that the students perceive a low degree of self-efficacy in their skills while entering the clinical setting. One reason could be that the knowledge is taught as separate entities rather than in a context relating to each other or that it is not perceived as meaningful at that moment (2, 3). Within the field of Dental Hygiene and Physiotherapy, we teach the students to use evidence-based practice and being able to read and evaluate the scientific literature. For us as academic teachers, we need to consider what is evidence-based regarding both the content knowledge of the profession and the learning processes that we organize for students to engage in through our teaching. The effort to seek best available evidence and apply a systematic and scholarly approach to teaching and learning is called *scholarship of teaching and learning* (4, 5). This paper describes a project aimed at enhancing meaningful learning and increased self-efficacy beliefs through learning activities that includes practising of skills together with students from another programme and our efforts as teachers to be scholarly in relation to those activities. The project is referred to as 'the scholarship project' throughout the article.

Scholarship of teaching and learning (SoTL), or academic scholarship as it is also called, was introduced by Ernest Boyer in 1990 and has implied a movement regarding the view on what high-quality teaching in higher education is worldwide (6). SoTL provides a framework for teachers which links the scholarly approach that is self-evident when carrying out research with the practice of teachers, and acknowledges higher education teaching as something that can be learned and developed towards a higher degree of excellence (7, 8). Excellent teachers need to consider and reflect on the content, what is taught, and on the process, how things are taught, as well as on localities/facilities and why activities are carried out in a certain way (4). This reflection and work is, however, very seldom reported in the literature. Boyer (8) states that development of scholarship of teaching would bring 'legitimacy to the full scope of academic work'. In this project, we report on our efforts to be more scholarly as teachers according to a model developed at the Centre for Medical Education at our university (9). The model suggests six activities included in the scholarship process, all with the aim to enhance the student learning experience (Fig. 1). The activities are part of an iterative process where some of the activities are revisited, and not thought of in any particular order. These principles have been applied throughout the present project in many ways:

1 searching for existing knowledge, via databases and literature, but also at conferences and through colleagues
2 development of our teaching practice
3 documentation of changes as well as results of our development of teaching
4 investigation of what happened as a result of our development of teaching and how this may be explained
5 making the work open for peer review among colleagues and experts by writing it up or presenting it
6 make public/share what we learned from our work.

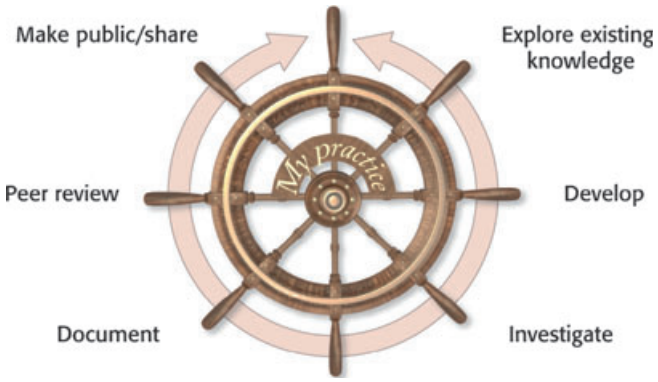

Fig. 1. Scholarship model as developed by the Centre for Medical Education, Karolinska Institutet. Graphics: Mattias Karlén.

Exploring existing knowledge

We recognized a shared issue in our learning environments in higher education; it was challenging for us to support students to trust their new abilities in providing professional services. As we explored the literature on theories of learning, we found three concepts that were useful for us: constructivist view of learning, meaningful learning and self-efficacy beliefs. The concepts were chosen because they interlink with each other and our view on what learning is about in professional education. You would even say 'professional health education'. Emphasis in these concepts is on the individual learners and their relation to what is to be learned. The ultimate goal is to create a professional with a high degree of self-efficacy. We believe that the best way to achieve that goal is through these concepts, i.e. we emphasize the importance of students constructing the own knowledge. The concepts are described as follows.

Constructivist view of learning

A constructivist approach (2, 10) to learning assumes that students are the main focus and construct their own knowledge, which cannot be constructed for them by for instance telling or just showing them – they need to elaborate and process information and experiences, relate to prior knowledge and construct their own understanding. Learning is expected to be more meaningful if (i) it is learned in a context similar to where it is meant to be applied, (ii) it is experienced as relevant and meaningful and (iii) it is set in a real situation. Learning is determined by many factors, such as student's characteristics and approaches to learning, which all interact with each other (11). Learning is an active constructivist process, which means that the students can interpret the knowledge into what they already know and in that way create a broader and deeper understanding (12). Before learning can take place, factors related to student's characteristics as well as the teaching context have to be considered (11, 13). Student factors include prior knowledge (theoretical as well as skills) that the students have about the topic, their interest, ability and learning style. It is critical for teachers to understand the

distinctions between characteristics of students and the nature of different approaches to learning (14).

Meaningful learning

To facilitate a meaningful learning, students need to be encouraged to relate previous knowledge to new knowledge, to apply theoretical ideas in vocational training and to organize and structure content into a coherent whole (11). The literature on meaningful learning coincides with the literature on deep and surface learning (15) and pinpoints issues such as relevance to the future profession, interest and authenticity of the task as important for supporting students into meaningful learning.

Self-efficacy beliefs

Another issue related to learning and transfer of knowledge is the use of competence in a new situation, i.e. self-efficacy, which we have experienced to be low in our students. Self-efficacy is defined as the belief that one is capable of performing in a certain manner to attain certain skills (16). The concept of self-efficacy lies at the centre of the Social Cognitive Theory, a theory that emphasizes the role of observational learning and social experience in the development of skills (17). The theory suggests that students with a low perceived self-efficacy towards their ability are unlikely to grow and expand their skills. Four sources that can increase self-efficacy have been pointed out: (i) experience: success raises self-efficacy; (ii) modelling: when people see someone succeeding in something, their self-efficacy will increase; (iii) social persuasions: positive persuasions increase self-efficacy; and (iv) psychological factors: people that can interpret physiological signs (e.g. butterflies in the stomach) in stressful situations as normal and unrelated to his or her actual ability have high self-efficacy.

Development of the project

Based on the research on student learning, three central theories were identified (constructivism, meaningful learning and self-efficacy). These were applied in our context to support learner engagement and the application of prior knowledge in a new situation.

Our goal was to engage the learners. We designed an activity through which our two different groups of students practised the skill of 'motivational interviewing' with each other as patients. This gave the students the opportunity to experience an authentic environment and authentic tasks with relevance for their future professions. The dental hygienist (DH) profession promotes oral health among individuals and include prevention and lifestyle changes, as well as diagnosing and treating oral diseases (18).

The DH programme at the Karolinska Institutet includes both theoretical and clinical work with patients where new skills can be practised and evaluated. Evaluation data from several years of the clinical courses identified that there was a need for increased practice opportunities in real-life situations to enhance self-efficacy among the students. Therefore, a new pedagogic approach was developed where the students themselves would take full responsibility for the care provided as this was believed to contribute to a more meaningful learning and activity. The resulting revised clinical course (19) included knowledge in several fields such as cariology, periodontology and communication skills. One specific learning outcome in the course was to independently perform a clinical examination and treatment using motivational interviewing as a prevention strategy.

Physiotherapists (PTs) work with primary, secondary and tertiary prevention of chronic and lifestyle-related diseases (20). The increased prevalence of such diseases has resulted in an increased emphasis in the work of PTs towards education and behavioural modification approaches to support lifestyle changes (21). Hence, there has been an increased emphasis on related abilities in PT educational programmes. This combined with a general trend in post-secondary education towards ability-based and outcome-based approaches, resulted in the development of a new 'Health Promotion' course at the Karolinska Institutet (22). The curriculum for PTs involves the knowledge of health promotion including a focus on public health sciences, psychology, ergonomics and physiotherapy. The learning outcomes for the SoTL project were developed to address these subjects. One specific learning outcome was to be able to use evidence-based methods to support lifestyle changes such as health tests; motivational interviewing was deemed as a critical element of such curriculum.

A common denominator for the DH and PT professions is prevention strategies including motivational interviewing. Motivational interviewing is a client-centred, guided directive method for enhancing intrinsic motivation for behavioural change by exploring and resolving ambivalence (23). Prevention strategies are part of the courses in the DH and PT programmes as described earlier. Therefore, our intention was for the two groups to learn by practising a range of skills including motivational interviewing with each other as patients. Our hope with this scholarship project was to achieve meaningful learning by students practising in a real situation as opposed to simulated exercises with their own professional peer as the patient. They would be expected to take responsibility, be active and engaged, transfer theoretical knowledge to a new context and reflect on the task performed. It was expected that such learning activities would increase learners' self-efficacy given that the learners would not know each others' areas of expertise and would therefore become aware of their own depth of knowledge. The expectations of successful learning activities were that self-efficacy can be increased when students practise on a group who do not know their area of expertise and realize that they actually know a lot. These learning activities can also be seen as progress towards the role of a primary care provider.

Objectives

The aim of this scholarship project was two-folded. We wanted to (i) evaluate the impact of engaging in scholarship of teaching

and learning as part of our practice as academics at a medical university and (ii) enhance self-efficacy beliefs of professional learners through authentic learning activities that included providing services to students of another programme.

Material and methods

Participants

This scholarship project took place in autumn 2008 and spring 2009. After conducting the literature review, few teachers from the DH and PT programmes met to identify the content of the learning activity and the protocols to support its implementation that would work for both programmes. The DH students were in their fourth semester. They had previous experience with some patients during semester 3. The PT students were also in their fourth semester and had a short clinical period in semester three and earlier in semester four.

Students from courses during two semesters were included, resulting in 51 DH students (26 and 25 per semester, respectively) and 103 PT students (52 and 51 per semester, respectively) and). Among the DH students, five were men, and among the PT, 22 were men. There were two teachers in the DH programme and three teachers in the PT programme involved.

The teachers involved in the project

We have been university teachers for several years and are committed to promoting teaching and learning in healthcare education. To this end, we have been exploring pedagogic issues including the development of teaching strategies. This current collaboration between our programmes is one example of this development; it arose from our discussions in the course 'Scholarship in teaching and learning', which was part of our own educational experiences.

Procedure of the learning activity

The DH students in the fourth semester performed a clinical oral health examination, including a dietary history and a caries and periodontal health status assessment for the PT students. The DH students used motivational interviewing skills to support oral hygiene and dietary changes. After the assessments, the student provided the patient with an individualized summary regarding their oral health status with instructions for home care. The students also received summative feedback from the faculty member.

During the fourth semester, the PT students performed an individual health test on the DH students. The health test included motivational interviewing regarding lifestyle habits in general, assessment of blood pressure, weight, waist circumference and a submaximal aerobic capacity test on an ergometer bicycle. The test findings were summarized for the patient, and an individual goal to support general health was developed in collaboration with the patient. The students were informed of the procedures by both programme teachers separately in the beginning of the course. Two students from the DH class informed the students from the PT class and vice versa.

The students took full responsibility for the assessments, and they performed the assessments on their own. A teacher was nearby in case any problems arose. Each programme had a structured compulsory seminar for questions and reflection a couple of days after the learning activity. The seminars were held in smaller groups of DH/PT students (6–8 students per DH/PT teacher).

Documentation

To obtain an insight into benefits or limitations of the scholarship project, compulsory seminars with groups of six to eight students were performed as a learning activity. Each of the seminars started with practical issues regarding the skills practised both to 'warm up' the discussions and as a pedagogic tool for peer learning. The dialogue regarding the learning activity was directed by some questions regarding the training and how the results were interpreted and communicated to the 'patient'.

The students were prompted to delve deeper into their responses to reflect on what they learned and how this could be used in practice both within the programme and upon graduation. Two teachers were involved in each seminar to promote consistency for documenting the information. One teacher took notes and then summarized the process and the content of the discussions. The other teacher facilitated the session and then reviewed the summarized notes for errors, omissions and additions. To gain a more complete understanding of the intervention, the students were asked to complete a questionnaire about their perceptions of the learning experience, *i.e.* (i) their degree of self-efficacy beliefs in performing the motivational interviewing, (ii) their degree of self-efficacy beliefs in performing the practical skills and (iii) their overall thoughts about the learning activity. A 4-point scale was used with the following options: totally agree, partly agree, partly not agree and not at all agree.

Participants also had the opportunity to make comments about each of the items. The numeric data were reported in percentages, and the open-ended comments were included with the other data from the seminars. Although we are aware of the existence of questionnaires regarding self-efficacy beliefs (17), the questionnaire was developed for this specific learning activity.

Results

The findings of the investigation are based on the students' and teachers' perception of this scholarship project. We will present the findings both from the questionnaires and with quotes from the seminar. After the learning activity, the DH and PT students reported that they perceived a higher degree of self-efficacy concerning motivational interviewing [31% (n = 16) and 62% (n = 32) fully agree, 55% (n = 56) and 37% (n = 38) partly

agree, respectively]. They also highlighted during the seminars that it is important to practise giving support to behavioural changes. Furthermore, a high proportion of the DH and PT students (72%, $n = 37$ and 98%, $n = 101$, respectively) reported that they felt more confident in performing the tests.

The DH and PT students were overall satisfied with the learning experience (81%, $n = 41$ and 99%, $n = 102$, respectively) and commented that they felt positive in taking care of the patient by themselves:

I felt satisfied with the learning activity, it was positive to take own responsibility for the patient which increased my confidence.

The seminar contributed to a deeper understanding of learning.

The activity also yielded an insight into their own learning experiences and also additional findings related to the other professions' ability and skills:

The information and instructions that I got from my therapist was too basic and didn't enhance my motivation to perform oral hygiene.

The information I received was not directed at me, but more in general, and this made me reflect on how I inform my patients.

The constructive view of learning was emphasized through the student's comments from the questionnaire and during the seminaries. They asked questions that promoted them to think further, and as revealed by both student groups, the advantage of carrying out patient examination and treatment at the same time was that they could focus on the whole context, not just the parts:

To investigate and treat the PT in the same occasion was good for the self-confidence as a DH, and the knowledge that you can work more efficiently.

When I heard the results of the health test I learned that it is important for me as a health care professional to be prepared.

A majority of the PT students reflected on the advantage of practising the skills on someone who does not know their field of expertise:

It was advantages to treat a student from another profession who was not familiar with my line of work.

The DH students perceived that the written document about the PT students' oral health status was a meaningful activity and gave them an opportunity to more thoroughly reflect over the patient's oral health status and to put it in writing for the patients to understand:

Writing a research protocol to the PT students was a very meaningful activity because it provided the opportunity for further reflection. It was hard to write in an understandable way.

Most of the DH and PT students highlighted that it was an advantage to discuss other student's experiences of the learning activity, including the treatment and the dialogue with the patients:

The theory behind and the practice of motivational interviewing is the same for both programmes.

Both DH and PT students highlighted the meaningfulness of learning to listen to how other healthcare professions communicate with the patients and how they work to bring about change in lifestyle behaviours:

It was very valuable to listen to how someone else performed the motivational interviewing where the purpose was to change a health behavior.

Several students commented that they had prepared for the session by reviewing the literature about motivational interviewing and had made notes to support them during the interview.

Another aspect that was raised by many DH and PT students was that they had reflected on how many small factors fit together as a whole and began to realize that the 'whole' reflected professional competence. The students identified some examples of unprofessional conduct such as lapses in infection control, ineffective time management, lack of punctuality and using excessive pressure during instrumentation.

Peer review and making public/share

From a teaching and faculty perspective, we noted several aspects that were advantageous for the students as well as for us as teachers in the project. We come from different backgrounds and work in different contexts but realized that we share so many pedagogical challenges. By constantly reviewing our work and discussing the project, we became more aware of the importance of the use of best evidence in both what is taught and how it is taught. During this project, we discussed and developed the intended learning outcomes and learning activities for each programme, which we think is fruitful for making the learning outcomes and learning activities understandable for the students. Further, we shared experiences on how to deal with specific issues related to scheduling, assessment criteria's during examinations and student-related issues:

We have different backgrounds and work in different areas, but share many educational challenges with the teachers from the other programme.

Peer review is one component of the scholarship model; we solicited the input of other members of our course in the 'Scholarship in Teaching and Learning'. Other teachers provided us with constructive feedback, and we also had the opportunity to review the work of other groups. This also helped us to identify the pros and cons of our project.

Discussion

In the present study, we have followed the steps in the scholarship model to enhance meaningful learning and self-efficacy among DH and PT students by the use of best evidence teaching. The article is an account of our efforts to be

scholarly as teachers and how we went about the task to try to enhance the student's learning experience.

Scholarship

The relevance of this scholarship project has indirectly been highlighted by Paulson (24) who claimed that investigating the relationship between teaching and learning is important and that a well-developed scholarship will lead to innovations in theory, an impact on practice and further scrutiny. From the teachers' point of view, this project led to increased reflection and a deeper understanding of the importance of evidence-based teaching and a deeper awareness of the teaching process with a focus on the relationship between teaching and learning. This has been documented by others (7–9). As suggested by Hutchings (25), the process of developing a new course or new learning activity within a course to having it integrated within the programmes has been challenging but in the long-run rewarding. For example, to first detect possible activities that students can practise with each other to arranging the learning activities takes many logistics with regard to facilities and scheduling has been tricky. The next step, making these learning activities a meaningful part for the students during their journey to become a professional, has lead to enhanced awareness of the importance of preparing the students in their development of professional skills.

We have also become more aware of other learning activities provided for the students and how important it is that all teaching includes time for self-reflection including the sharing of those reflections with peers. During the seminars, the students could give feedback on how they perceived the learning experience. This was helpful for us as teachers in order to further develop the courses. This is supported by Knight *et al.* (26) who showed that development can be driven by students' feedback and by the teachers' own learning experience as a student.

One of the parts in this scholarship project was to include a link between SoTL and evidence-based DH and PT methods in both preclinical and clinical works. This is supported by a recently published qualitative study that emphasized the importance of having links between teaching, research and clinical work (27). Teaching is an exciting and rewarding job, but it takes time, skill and dedication. Further, teaching needs to be continuously developed and the demands on the universities to deliver high-quality teaching are high (28). We have a goal to become 'excellent teachers' as described by Kreber *et al.* (4).

In this project, we had a chance to focus on the criteria for excellent teachers (i.e. reflection on the content, what is taught, the process, how things are taught and why activities are carried out in a certain way). This was an enlightening and learning experience for us as well.

Students' perception

From a student perspective, the overall findings were positive and the collaboration between the two programmes has now been incorporated in the curriculum. Trigwell *et al.* (29) argue that when students gain an understanding of their prior knowledge, it increases their confidence in their own abilities in practical situations. This is further facilitated by explaining something to others as well as hearing others explaining nearly the same thing. Such an approach is grounded in social constructivism (17). The students also perceived that the activity had strengthened their self-efficacy. The study by Luszcynska and Gutiérrez-Dona (30) suggests that people with high self-efficacy beliefs take on challenging tasks and think that they can overcome obstacles when compared with those with lower levels of self-efficacy beliefs. Additional positive findings in the project were observed, such as an increase in the awareness of professional and tacit knowledge. In this project, the quality of the work, i.e. MI, that the students performed was not evaluated.

In the seminars and during the course evaluations, the students reflected on the concept of tacit knowledge. In both programmes, for example, tacit knowledge is mainly discussed in lectures regarding the professionals and ethics and hardly ever experienced prior to clinical practice. Maudsley and Strivens (31) highlight the importance of promoting responsibility, concrete experience and participation for professional knowledge acquisition. This is in line with the theories on which factors support meaningful learning and therefore confirm the additional findings of our project. In this project, the students reported that the theories and practical skills were of equal importance to the art and science of the profession as supported by Malterud (32).

Because of practical reasons, the seminars were held separately for each profession. Our future plan is to arrange the seminars together and enhance the peer reviewing between the students from both programmes, especially about motivational interviewing, and how the students perceived the experience as a 'patient' and as a 'clinician'.

We believe that a similar project can be implemented within other educational programmes as well and that it can motivate teachers at both preclinical and clinical settings to reflect on academic scholarship.

Conclusions

The scholarship model made the teachers aware of the importance of evidence-based teaching. Furthermore, the indicators for meaningful learning and increased self-efficacy were high, and the students became more engaged by practising in a real situation, more aware of other health professions and reflected about tacit knowledge.

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Conflict of interest

None declared.

References

1 Bolander Laksov K, Lonka K, Josephson A. How do medical teachers address the problem of transfer. *Adv Health Sci Educ* 2008; **13:** 345–360.

2 Marton F, Hounsell D, Entwistle N, James W. *The Experience of Learning: Implications for Teaching and Studying in Higher Education*. Edinburgh: Scottish Academic Press; 1997.

3 Entwistle NJ. ''Approaches to studying and levels of understanding'': the influences of teaching and assessment. in: Smart JC, ed. *Higher Education, Handbook of Theory and Research*. Vol. **XV.** New York**:** Agathon Press, 2000, pp. 156–219.

4 Kreber C. Teaching excellence, teaching expertise and the scholarship of teaching. *Innov Higher Educ* 2002; **27:** 5–23.

5 Trigwell K, Martin E, Benjamin J, Prosser M. Scholarship of teaching: a model. *Higher Educ Res Dev* 2000; **19:** 155–168.

6 Bolander Laksov K. *Learning across paradigms – towards an understanding of the development of medical teaching practice*. Thesis. Stockholm, Sweden: Karolinska Institutet; 2007.

7 Adcroft A, Lockwood A. Enhancing the scholarship of teaching and learning: an organic approach. *Teach Higher Educ* 2010; **5:** 479–491.

8 Boyer E. *Scholarship Reconsidered: Priorities of the Professoriate*. Princeton, NJ: The Cambridge Foundation for the Advancement of Teaching; 1990.

9 Bolander Laksov K, McGrath C, Silén C. Scholarship of teaching and learning – vägen till ett akademiskt lärarskap. CME-guide nr 6 Karolinska Institutet, 2006. Available at: http://ki.se/ki/jsp/polopoly.jsp?d=20077&a=24640&l=sv (In Swedish) (accessed 1 February 2010).

10 Bruner J. *The Culture of Education*. Cambridge, MA: Harvard University Press; 1996.

11 Biggs J. *Teaching for Quality Learning at University*, What the student does. 2nd edn. London: The Society for Research into Higher Education and Open University Press; 2003.

12 Dysthe O. *Dialogue, Interaction and Learning (Dialog, Samspel och lärande, in Swedish)*. Lund: Studentlitteratur; 2003.

13 Hounsell D. Understanding teaching and teaching for understanding. In: Marton F, Hounsell D, Entwistle N., eds. *The Experience of Learning: Implications for Teaching and Studying in Higher Education*. Edinburgh, Scottish Academic Press, 1997.

14 Ramsden P. *Learning to Teach in Higher Education*, 2nd edn. London: RoutledgeFarmer; 2003.

15 Marton F, Booth S. The learner's experience of learning. In: Olson DR, Torrance N. editors. *The Handbook of Education and Human Development: New Models of Learning, Teaching and Schooling*. Oxford, Blackwell, 1996, 534–564.

16 Bandura A. *Self-Efficacy: the Exercise of Control*. New York, WH: Freeman and Company; 1997.

17 Bandura A. *Social Learning Theory*. Alxandria, VA: Prentice Hall; 1977.

18 National Board of Health and Welfare. *Competence Description for Registered Dental Hygienist (Kompetensbeskrivning för Legitimerad Tandhygienist. In Swedish)*. Stockholm: Socialstyrelsen; 2005. Report 205-105-1. Available at: http://www.tandhygienistforening.se/fileadmin/Documents/Kompetensbeskrivning_foer_tandhygienist.pdf (accessed 1 February 2010).

19 Study curriculum Dental Hygienist program. Karolinska Institutet. Available at: http://pingpong.ki.se/public/cohrseld/6304/coursePath/5549/ecp/lang-sv/publicPage.do?item=3896170 (accessed: 1 February 2010).

20 Swedish Association of Registered Physiotherapists. Description of physiotherapy, and physiotherapy as a field of practice. *Sjukgymnasten* 1998; **1:** 32.

21 Lindquist I, Engardt M, Garnham L, Poland F, Richardson B. Physiotherapy students professional identify on the edge of working life. *Med Teach* 2006; **28:** 270–276.

22 Study curriculum Physiotherapy program. Karolinska Institutet. Available at: http://www.ki.se/ua/utbildningsplan/1SY07.pdf (accessed 1 February 2010).

23 Rollnick S, Miller WR, Butler C. *Motivational Interviewing for Health Care Professionals*. New York: Guilford Press; 2007.

24 Paulson MB. The relationship between research and the scholarship of teaching. *New Directions Teach Learn* 2001; **86:** 19–29.

25 Hutchings P. The scholarship of teaching and learning: From idea to integration. *New Directions Teach Learn* 2010; **123:** 63–72.

26 Knight AM, Cole KA, Kern DE, Barker LR, Kolodner K, Wright SM. Long-term follow-up of a longitudinal faculty development program in teaching skills. *J Gen Intern Med* 2005; **20:** 721–725.

27 Stenfors-Hayes T, Weurlander M, Dahlgren LO, Hult H. Medical teachers' professional development – perceived barriers and opportunities. *Teach Higher Educ* 2010; **4:** 399–408.

28 Swedish National Agency for Higher education. Högskoleförordningen. In Swedish SFS 2010:1064.

29 Trigwell K, Prosser M, Waterhouse F. Relations between teachers' approaches to teaching and students' approaches to learning. *Higher Educ* 1999; **37:** 57–70.

30 Luszcynska A, Gutiérrez-Dona B. General self-efficacy in various domains of human functioning: evidence from five countries. *Int J Psychol* 2005; **40:** 80–89.

31 Maudsley G, Strivens J. Promoting professional knowledge, experiential learning and critical thinking for medical students. *Med Educ* 2000; **34:** 535–544.

32 Malterud K. The art and science of clinical knowledge: evidence beyond measures and numbers. *Lancet* 2001; **358:** 397–400.