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Meaningful learning: students' perceptions of a new form of case seminar in pathology

Maria Weurlander¹, Italo Masiello¹, Magnus Söderberg² & Annika Wernerson²

¹Department of Learning, Informatics, Management and Ethics, Karolinska Institutet, Sweden.

²Department of Laboratory Medicine, Division of Pathology, Karolinska University Hospital, Sweden.

Corresponding author:

Maria Weurlander

Department of Learning, Informatics, Management and Ethics, Karolinska Institutet,
171 77 Stockholm, Sweden.

+46-8-524 837 68

maria.weurlander@ki.se

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Abstract

Background: Student-centred activities have been developed in a pathology course for medical students.

Aim: This study reports on students' perceptions of a new form of case seminar as a way to learn pathology.

Method: The seminar was evaluated through open-ended questionnaires and the data was analysed with a qualitative content analysis approach.

Results: All students reported that the case seminar was a positive learning experience. Four aspects of importance for learning were identified: motivational, knowledge construction, contextual and collaborative aspects. The motivational aspects concerned an increase in interest and motivation to learn, while the knowledge construction aspects included enhancing memory formation and facilitation of understanding. The case seminar also **seems to** help the students relate the textbook knowledge to a real world context and future profession, which can be described as the contextual aspects of learning. According to the students in our study, the work in small groups resulted in positive collaborative aspects of learning.

Conclusions: The new case seminar could be an effective teaching and learning activity. It can be used in a traditional course as a complement to lectures and does not require a major change in the course design. It is also well suited for integrated curricula.

Keywords: case seminar, student-centred activities, student learning, medical education

Introduction

Pathology, the study of diseases, has traditionally been taught through lectures, autopsy demonstrations and microscopy exercises; teaching methods that in their traditional structure allow students to be passive recipients of information. This way of teaching builds on the assumption that teaching is a matter of transmitting knowledge and learning is about receiving this knowledge. However, research on student learning suggests that teaching as mainly transmitting information does not result in quality learning (Biggs, 1999; Trigwell *et al*, 1999; Bransford *et al*, 2000). It has been argued that teachers in higher education need to focus on how to facilitate students' learning, instead of focusing on what and how to teach (Biggs, 1999). Educational theories describe learning as an active process, where the learner constructs knowledge with the aim of reaching a deep understanding of the subject matter (Perkins, 1999; Bransford *et al*, 2000; Leach & Scott, 2003; Dolmans *et al*, 2005). Learning involves both individual and sociocultural aspects, which means that the individual learner constructs his or her own understanding in a specific context and by interacting with others. These ideas stretch back to the work by educational psychologists in the early 1900s (Dewey, 2004; Vygotsky, 1978). Accordingly, meaningful learning is the active, constructive, process of making meaning of the world enabling the learner to use knowledge in new and unfamiliar situations (Mayer, 2002).

Student learning

Students go about their learning in different ways and have different motives and goals with their studies. A body of research on student learning suggests two main learning patterns: one focusing on reproduction and memorisation (surface approach or reproduction-directed learning), and the other focusing on meaning-making and relating (deep approach or meaning-directed learning) (Lonka & Lindblom-Ylänne, 1996; Vermunt & Vermetten, 2004; Marton *et al*, 2005). These learning patterns include intrinsic factors such as ideas on what it means to learn something (conceptions of learning), strategies to solve a learning task, personal goals and intentions. In addition to these factors, the learning pattern students adopt depends on extrinsic factors, that is, how they perceive various aspects of the learning environment (Trigwell & Prosser, 1991; Biggs, 1999; Lizzio *et al*, 2002; Mattick & Knight, 2007). For example, heavy workload and assessment focusing on factual knowledge are factors associated with reproduction-directed learning. Promoting understanding and self-involvement of students are factors associated with meaning-directed learning. The latter has been shown to have a positive effect on academic performance (Lindblom-Ylänne & Lonka, 1999; Lizzio *et al*, 2002).

The learning pattern students adopt in a specific learning situation is also closely linked to their motivation. Students differ in their motivation to engage in a learning task (Biggs, 1999). Extrinsic motivation is when external factors, such as obtaining a reward (a pass grade) or avoiding something negative (a fail grade), become the main motive for engaging in a learning task. Intrinsic motivation, on the other hand, is when internal factors such as a genuine interest to learn, is the source of motivation. Students who are interested in the subject matter or the task at hand are more likely to spend more time and put more effort into the learning task, which in turn have a positive effect on the learning outcome (Schiefele, 1991).

Taken together, research suggests that university teaching should stimulate students' interest and actively engage the students to promote meaningful learning (Schiefele, 1991; Biggs, 1999; Trigwell *et al*, 1999; Bransford *et al*, 2000).

Educational development in medical education

During the last decades, there has been a shift from teaching as knowledge-transmission to student-centred methods. Problem-based curricula are becoming common in medical schools (Kumar *et al*, 2001; Harden, 2000), as well as other student-centred teaching and learning activities. Such activities include interactive lectures to promote active learning (Steinert & Snell, 1999; Cortright *et al*, 2005; Fyrenius *et al*, 2005), laboratory work which requires students to predict, explain and discuss experiments and not just follow protocols (Modell *et al*, 2004), case methods where students analyse and discuss clinical cases (Stjernquist, 2001; Tärnvik, 2004) and team-based learning where students solve problems in groups (Seidel *et al*, 2001; Haidet *et al*, 2002; Koles *et al*, 2005).

In integrated medical curricula, student-centered activities may support students when applying basic science to clinical medicine (Kumar *et al*, 2001). Integration of basic and clinical sciences seems to have become a standard approach in current medical education (Harden, 2000). Therefore, it is essential to understand this process, and the learning of pathology offers a good case since it bridges basic sciences and clinical medicine as well as normal and abnormal physiology and histology (Kumar *et al*, 2001; Marshall *et al*, 2004).

The present study

In this study we evaluated a newly developed form of case seminar which is part of a lecture-based pathology course. The medical curriculum which constitutes the context of this study focuses on basic sciences (cell biology, anatomy, physiology etc.) in the first two years of studies, followed by three and a half years of clinical courses (surgery, internal medicine etc.). Pathology is taught at the end of the second year. Even though the medical curriculum is traditional, new educational methods have been developed by medical teachers interested in educational development. For some years, two of the present authors (AW and MS) have developed and implemented new teaching and learning activities in the pathology course aiming at promoting meaningful learning. In addition to these activities, the pathology course includes more traditional teaching methods such as lectures, autopsy demonstrations and seminars with discussions around histological specimens.

Aims of the study

The aim of this study was to evaluate medical students' perceptions of the new form of case seminar in the pathology course. The aim was also to investigate in what way this activity contributed to learning as perceived by the students.

Design of the case seminar

The case seminar, evaluated in this study, consists of two sessions, named “macro” and “discussion”. The case seminar has been implemented in renal, gastrointestinal and gynaecological pathology. Other parts of the pathology course are taught through lectures and microscopic seminars only. During the macro session, students work in small groups (3-4 students) with one or two surgical specimens and a written patient history. The surgical specimens have been collected over several years and chosen to illustrate different diseases. The specimens are fixed and kept in formalin and can therefore be reused. Before the macro session, the specimens are rinsed in water for a few days. The clinical cases used in the seminar are based on real patient material, but the patient histories are altered to prevent identification. During the macro session, the students’ task is to evaluate and describe what they see in the macro specimen and also try to make a diagnosis. They have access to textbooks and pathology teachers, but the aim is for the students to come up with a suggestion of diagnosis themselves. The groups have different cases and at the end of the seminar the students present their case to their peers and explain the disease, its causes and pathomechanisms. The teachers may also take part in these discussions if they are invited by the students. At the end of the seminar the students receive a hand-out with all the patient histories covered in the seminar, followed by questions concerning the diseases. A couple of days after the macro session, there is a discussion session where pathology teachers together with students go through the cases again. In this session, students take an active role and describe their findings, mainly related to the pathological processes of the diseases. The pathomechanisms are also discussed in relation to the histological pictures which are shown for each case. The seminars give opportunities to the teacher to answer student questions and develop a discussion on possible difficulties that students might have encountered.

The new form of case seminar compared to Harvard Case Method

The case seminar described above has similarities and differences with the Harvard Case Method. Both methods use an authentic problem or case as a starting point for learning, and both involve small-group learning. Both methods also aim to enhance the application and contextualization of theoretical knowledge (Mauffette-Leenders *et al*, 1997). Harvard Case Method often focuses on decision making and problem-solving and is extensively used in business and law schools at many universities. This case method is also well suited for clinical cases where students explore alternative diagnoses and suggest treatments (Stjernquist, 2001; Tärnvik, 2004). In our case seminars, the students focus on the pathophysiology of the diseases. The major difference between our new form of case seminar and the Harvard Case Method, is that the students work in small groups with different cases, use surgical specimens and patient histories and present and explain their case to their peers. In the Harvard Case Method all students usually work with the same case or problem.

Method

Participants

The participants in this study were medical students taking the pathology course in year two of the medical curriculum. Participation was voluntary and the students’ responses were anonymous. It was made clear orally to the students that participating in the study could not in

any way influence their passing or failing of the course. The students were informed about their rights as participants, according to the guidelines for research involving human subjects.

Data collection and analysis

The medical students' perceptions of the case seminar were evaluated by two open-ended questions. The answers were collected immediately after one of the case seminars. The questions asked were: "What are your thoughts on the case seminar as a teaching method?" and "Have the case seminar helped you to learn pathology? If so, in what way? If not, why?" The answers from the two questions were analysed with a qualitative content analysis approach where the data was coded and grouped into categories. The resulting categories expressed the aspects found in the entire data. The statements made by one student were categorised into one or several of the categories. The data were subsequently analysed and classified into categories by all authors independently in order to enhance credibility of the analysis.

Results

Fifty-three out of sixty second-year medical students participated in the evaluation of the case seminars. All students expressed a positive learning experience and considered the seminars helpful in learning pathology. Four aspects, perceived by the students to be important for learning, were identified: motivational, knowledge construction, contextual and collaborative (Table 1). Following is a more detailed description of each.

Insert table 1 about here

The motivational aspect

The students in our study found the case seminars to be a positive experience. One student mentioned that the seminars motivated her in seeking more information; other students used words such as inspiring, instructive, fun or stimulating. Several students compared the case seminars with lectures and found the latter "boring", although some mentioned that lectures combined with case seminars are a good combination of teaching activities. The fact that the seminar awoke interest seemed important to the students. The following quote illustrates the motivational aspect:

It's really, really interesting! Each time, before going to the seminar, I read the pathology book to be able to recognise the disease and the specimen. I was really motivated to work!

Student 15

Knowledge construction aspects

Most students mentioned that the case seminar helped them to learn pathology indicating that the case seminars helped the students to construct knowledge. We found three sub-aspects of knowledge construction: some students stated that the seminars helped them to remember, many students stressed that the seminars facilitated their understanding of the diseases while some students mentioned only vaguely that the case seminars were a good way to learn but did not specify in what way. Some students mentioned all sub-aspects. The following quotes illustrate the sub-aspects.

Learn: You learn much more from these interactive studies than just listening to lectures.

Student 11

Remember: It helps you to remember much better and also visualise them better. It sticks better in your mind.

Student 1

Understand: One learns to think, relate, ask questions and search for the answers. They are interactive, interesting, proactive and therefore effective way to learn.

Student 3

Contextual aspects

The students mentioned that the case seminar helped to connect theoretical knowledge with real clinical cases indicating the importance of the perceived context of learning. Here, too, we found sub-aspects: some students claimed the experience of seeing and feeling the specimens was important for their learning, others that the case seminars stimulated them to think like a clinician and that the way of working related to their future profession. The following quotes illustrate these sub-aspects:

Seeing and feeling: You get a much better idea of how a disease looks like when you feel and look at a specimen from all sides instead of a picture in a book.

Student 13

Relating to future profession: You get to think more in clinical terms and you get stimulated to read more when you realise that the cases from the book exists in reality.

Student 28

Collaborative aspects

The opportunity to discuss with peers and teachers was mentioned by the students as important. Some students felt relaxed to ask questions and appreciated the fact that there was time for questions. One student mentioned that discussing with peers can reveal his own misunderstandings. The following quote illustrates this aspect:

I learn a lot through discussions and look upon my peers as an asset. When you explain to each other you often use a simpler and plainer language than in the books. You also get the chance to ask questions that may not be asked during a lecture.

Student 29

Discussion

A new form of case seminar using surgical specimens, patient histories and group discussion to facilitate learning was developed and implemented as a part of a pathology course for medical students. This paper reports on students' perceptions of the case seminar. Four aspects of importance for learning were identified in our data: motivational, knowledge construction, contextual and collaborative. Students in our study mentioned that the case seminars were interesting and stimulating, the motivational aspect of learning. One explanation as to why the seminars were interesting might be that a patient history together with a surgical specimen from a real, living patient was used as a starting point. The students have an opportunity to observe and examine the pathological changes of the diseased organ and this might motivate them to find out the pathomechanisms which, subsequently, inspire them to read and prepare for the discussion session a few days later. A positive effect of using clinical starting points in teaching basic science has also been made by Klein *et al* (2002), who reported on a study where clinical problems were used in a cell and tissue biology

course. They found that this approach enhanced students' interest in the subject and motivation to learn. Interest seems to be linked to the time and effort students put into a learning task and as a consequence, influences the learning outcome (Schiefele, 1991). Students in our study also mentioned that the case seminars helped them to remember or understand pathology better, which we categorised as the knowledge construction aspects of learning. The case seminars are divided in two parts: the macro session, where the student with the help of surgical specimens and patient histories reason around probable diseases, and the following discussion session, where the diseases and their pathomechanisms are discussed. Since the discussion session is held a few days after the macro session, the students have time to read about the pathomechanisms of the diseases relating to the cases. Teaching and learning activities where students are encouraged to relate theoretical knowledge to authentic problems or cases and learn in meaningful contexts can facilitate understanding (Newton, 2000; Bransford *et al* 2000). In pathology it is important for students to learn not just a number of diseases, but also to see the patient behind the disease, understand the pathophysiological mechanisms of the disease and to understand the role of pathology in clinical practice (de Boulay, 1997). Understanding the pathophysiological mechanisms of diseases can help to remember the diseases and to understand how the mechanisms causes the symptoms (Woods *et al*, 2005; 2007a, b).

Using surgical specimens and patient histories in the case seminars seemed to help students connect theoretical knowledge with real life examples; the contextual aspect of learning. Some students in our study also thought that the seminars linked to their future profession. From this point of view the relevance of the seminar is high, which can enhance the motivation to do the task. Mattick and Knight (2007) report in a recent study, that students' perception of relevance of information had an impact on their learning strategy. Several students in our study referred to the experience of seeing and feeling the specimens, suggesting that the visual and tactile experience was important for their connection of the real example to the textbook knowledge of the disease. A study on medical students learning of anatomy also suggests that the visual aspect of learning is important in medicine (Pandey & Zimitat, 2007).

During the seminars, the students worked in small groups, which many found helpful. Among the collaborative aspects of learning that students mentioned were opportunities to discuss with peers and teachers and having time for questions. Research on the cognitive effect of small group learning in problem based learning (PBL) suggests that group discussions stimulate activation of prior knowledge, recall of information and causal reasoning (Dolmans & Schmidt, 2006). Dialogue, where the learners express their thinking and activating prior knowledge, is required in order to solve problems together (Dillenbourgh, 1999). Collaborative learning can also enhance critical thinking (Gokhale, 1995) and stimulate students' interest in the subject matter (Dolmans & Schmidt, 2006). Steinert found that students' views on what makes small group teaching effective, involved the use of clinically relevant cases that encouraged problem solving and discussion (Steinert, 2004).

Learning is complex and the four aspects found in our study play important parts in this process. We believe that these aspects are intertwined and influence learning in various ways. For instance, putting theoretical knowledge in a relevant context can evoke students' interest and help them see the bigger picture and thereby help them gain a deep understanding of the

subject matter. Discussing with peers can help to gain new insights which in turn facilitates understanding. When individuals have a deep understanding of a phenomenon, they are more likely to think flexibly around the phenomenon in new situations and have a capacity to explain, motivate and use critical reasoning when facing unknown problems relating to the phenomenon (Newton, 2000).

For medical students it is vital to be able to use their knowledge and think critically when faced with unfamiliar medical problems. However, even though students can gain a deeper understanding of the pathomechanisms of diseases, there is no guarantee that they can use their knowledge in clinical settings. There is evidence that transfer of knowledge from one context to another is problematic (Norman & Schmidt, 1992; Bransford *et al*, 2000). Making use of biomedical knowledge to reason about a clinical case can enhance learning of symptoms and diseases (Woods *et al*, 2007a) and possibly facilitate transfer from one context to another (Perkins & Salomon, 1994). As already mentioned, understanding of underlying pathomechanisms seems to be important in diagnosing difficult clinical cases (Woods *et al*, 2007b). Therefore, the new form of case seminar described in this paper may be a good example of how to facilitate a deeper understanding of pathomechanisms of diseases as well as possible transfer to clinical contexts.

The case seminars are well suited for implementing in both traditional and integrated medical curricula. In addition, the case seminars can be used in other curricula, eg., biomedical. The focus and level of difficulty can be adjusted with the questions relating to the diseases that are handed out prior to the discussion session. In our experience, biomedical students ask other types of questions during the seminar, building obviously on their deeper knowledge of molecular and cell biology.

Conclusions

The case seminar described in this paper can serve as an example of a teaching and learning activity that enhances the student's learning experience and seems to promote meaningful learning. The case seminars were perceived by the students to evoke interest, help them to remember or understand better, to bridge theoretical knowledge to a real life context and give opportunities to discuss with peers and teachers. They can be used in a traditional curriculum but are also well suited for integrated curricula.

The research project that this study is part of is an attempt to enhance the learning experience of medical students by implementing several student-centred activities. It is not enough to simply design better teaching and learning activities, but it is also necessary to investigate the students' perception of the learning environment to fully understand the effect on their learning (Struyven *et al*, 2006; Mattick & Knight, 2007). The students in our study found the case seminars valuable for their own learning. However, the seminars are only a part of the large pathology course. It is therefore important to conduct further research into how students perceive the course as a whole. This is essential if we want to gain a better understanding of how the learning environment affects student learning.

Practice Points

This form of case seminar:

- Uses surgical specimens and patient histories, which evoked student interest and motivation as well as stimulated them to think like a clinician.
- Is designed so that students work in groups, which stimulated peer discussion and allow time for questions.
- Can be used in a course with a traditional design as a complement to lectures and does not require a major change in course design.
- Is well suited for integrated curricula.
- Can be used for other students than medical students. The level of difficulty can be adjusted by changing the questions in the discussion session.

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Table 1.

Aspect	Students' descriptions included
Motivational	<ul style="list-style-type: none">• Motivation to work and learn• Fun• Interesting
Knowledge construction	<ul style="list-style-type: none">• Good way to learn• Help to remember• Makes it easier to understand pathological process in its entirety
Contextual	<ul style="list-style-type: none">• Looking at real macroscopic specimens instead of pictures in a book• The problem solving activity in trying to find a diagnosis is related to future profession as a physician.
Collaborative	<ul style="list-style-type: none">• Discussing with peers• Opportunity to ask questions and discuss with a teacher