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ON THE SCHOLARSHIP OF PEDAGOGY IN THE HEALTH SCIENCES

TAKING A PHENOMENOGRAPHIC APPROACH

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INTRODUCTION

The scholarship of pedagogy in the health sciences, the subject of this chapter, might be seen as a two-edged scalpel. By pedagogy I am referring to the communication between two people, one of whom strives for the other to understand, to learn, something of importance. In the health sciences this comes to the fore in the education of future health professionals, what we usually call teaching and learning and which the chapters of this book deal with in various ways. Here the Scholarship of Teaching and Learning (SoTL) has the well-established sense of the teachers taking a scholarly approach to their teaching, and to their students' learning. But the other cutting edge of SoTL can be placed in professional practices, whether it is the health science educator practising within the profession, as is often the case, or the health worker with a message to get over to a client or patient, or the newly graduated professional who has become habituated to teachers finding out about learning while at university and applying the same approach in her practice, or the professional charged with mentoring more junior colleagues. The practitioner can develop practices by taking a scholarly approach to his or her clients and their health issues. I suggest here that the scholarship of pedagogy has a continuation from the university to the professions (here the health science professions), from the SoTL practices of the educational institution to the professional practices of the health institution.

In this chapter I will attempt two tasks related to the overall theme: to describe a selection of published studies that address the pedagogy of the health sciences, some in higher education and some in health science practices. This chapter also has an interest in applicable methodologies for SoTL work across the board and the sort of research questions that can be addressed effectively. The studies chosen for this chapter all adopt a particular methodological approach to investigation, an

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approach that is equally valid for taking a scholarly gaze on either sorts of challenge, focusing on the experience of the learners or the clients. What this approach, namely phenomenography, brings sharply into focus is the knowledge that is being dealt with and the learning and understanding that is intended and achieved in pedagogical meetings, whether between teacher and student or health practitioner and client.

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When students set out to learn something there are three central and interlinked questions we can ask:

- How do they build on what they already know?
- How do they go about their learning tasks?
- What do they learn or understand?

In the first case, we know full well that students come to a course with very different prior knowledge, but we rarely know what variation is to be found there, which is what the phenomenographic approach can reveal (Marton & Booth 1997). In the second case, many phenomenographic studies report a deep and a surface approach to learning – identified by either making meaning of what is studied or studying for a test of some sort – but what these approaches mean in the context of a given knowledge and a given teaching approach has to be revealed through enquiry (Marton, Hounsell & Entwistle 2005). The third case is the subject dealt with in assessment. Exams generally distinguish between “right” and “wrong” and a scale between those two, whereas underlying misunderstandings can remain hidden unless there is deliberate enquiry. Three studies will be reviewed that tackle each of these questions in turn in areas of health science studies.

WHAT DO STUDENTS THINK THEY ARE LEARNING?

The first example of scholarly studies of teaching and learning in the health sciences addressing the ways in which students build on their prior understanding concerns a compulsory foundation biochemistry course for first-year undergraduates across the health sciences at an Australian university (Minasian-Batmanian, Lingard & Prosser 2005). The study took as starting point “a lack of literature on students’ perceptions of learning topic areas that are both compulsory and only foundation studies in a focussed, professionally oriented curriculum, which is highly constrained by a graduate skills outcome” (p.280), and an insight from existing literature that “students’ prior orientations to study and their prior understandings of the subject matter and how it is conceived are related to their perceptions of the teaching and

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learning context” (p. 280). The latter is a far-reaching insight, based on considerable research of both large-scale surveys of university students correlated to outcomes, and more focussed qualitative research studies on learning specific topics (Marton *et al.* 2005; Prosser & Trigwell 1999; Ramsden 1988).

The team of researchers, comprising subject lecturers and educational researchers with an academic development role in the university, surveyed 250 students in the faculty of health sciences during the third week of their first term at university and analysed the 203 responses they received. Just two open questions were put, one of which was: “What do you think biochemistry is about?” The responses were categorised in a lengthy process in which the three researchers independently worked with 30 randomly chosen responses. They then discussed them extensively to achieve united categories, and took on 20 more, independently, to fit into the derived categories and reassess them. This inductive process continued until a stable set of categories was arrived at, with agreement between researchers and an ease of assigning the remaining responses into the system. The criteria for such systems of categories are that they are qualitatively distinct, which means that each unit of a response can be assigned to a single category, though a whole response might contribute to more than one, and that they constitute a system of increasing complexity and completeness with respect to the intentions of the pedagogical aims.

The survey was repeated the following term, surveying the same students with a very similar question: “Having now completed Semester 1, what do you think biochemistry is about?” (Minasian-Batmanian, Lingard & Prosser 2006). Each of the surveys could be analysed deductively according to the same four categories that emerged from the first study. The categories are set out in Table 5.1, illustrated by typical contributory responses taken from the papers and the percentage of the class who responded in this way.

I am simply picking out one result from the two papers, whereas the authors coupled these results to other results from the survey and to demographic considerations of the student population. Considering first the categories in themselves, it is seen that they become increasingly inclusive, and that though the short, fragmented, responses might indicate a lack of interest in the survey or shortcomings in the written language, or a lack of prior knowledge of any extent or depth – the longer, coherent, ones are certainly more indicative of a more holistic understanding of the subject. From the outset, and even after having studied the course, there were still the same sorts of conceptions of the nature of the overall subject of study, in line with the notions of fragmented and coherent conceptions (Prosser & Trigwell 1999), and the percentages for each response are little changed.

THE SCHOLARSHIP OF TEACHING AND LEARNING IN HIGHER EDUCATION**TABLE 5.1** Categories of response for students' conceptions of biochemistry, and percentages per category

CATEGORY	Representative quotes and percentages			
	Three weeks into Semester 1		Two weeks into Semester 2	
A. Biochemistry is the study of chemistry or biology only	"Chemistry in biological systems." "Chemistry within the body." "I think it involves learning the chemistry of the body."	51.5	"Natural chemistry." "Biological chemistry." "Chemistry in the human body." "Study of body's chemistry."	45.7
B. Biochemistry is the study of chemistry and biology	"Biology and chemistry." "A combination of biology and chemistry." "Chemistry and biological principles."	25.7	"Biochemistry is a combined course between biology and chemistry." "The study of chemical and biological processes in the body."	25.7
C. Biochemistry is the study of chemistry and/or biology related to the body	"It involves both biology and chemistry combined that form explanations for the function and structure of the body." "Combining biology with chemistry to explain body functions and how homeostasis is maintained in plants and animals."	13.8	"The chemistry of the body and how that affects everyday living." "The way biology (and anatomy) relates to the chemistry that underlies it." "Chemistry and biology involved in understanding how living things survive and function."	27.6
D. Biochemistry is the study of the body structure and how they relate to chemistry and/or biology	"...the chemical characteristics of substances and how these affect bodily functions and necessary processes. For example, the structure/function of proteins/glycogen/fats in the body and how these work to provide energy/muscular contractions."	3.0	"Study of the chemical basis of life. Pretty well explains how the body operates on a molecular level to arrive at something greater."	27.6

Source: Minasian-Batmanian *et al.* (2005:285), (2006:1893)

Research has shown that students who have a mainly fragmented prior knowledge are more likely to fail to grasp the goals of the course and to be overwhelmed by it and are then likely to take a surface – reproducing or fulfilling perceived course demands – rather than a deep approach with its meaning making intent (Prosser & Trigwell 1999). Also evident is that the surface approach is associated with students failing to grasp critical elements of content and tending to forget content rather fast – which is not to say that they fail their examinations but that they might not have adequate prior knowledge for future courses.

There are numerous conclusions and points for discussion that arise from these articles (see Minasian-Batmanian *et al.* 2005, 2006). The point to make in this chapter is,

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however, that a scholarly study of entering students has been carried out to inform the academics involved in teaching of what pre-knowledge and learning practices their students come in with and what they glean, in terms of overall comprehension of the nature of the subject they are studying. It emphasises the essential point that students do not come in as empty vessels waiting to be filled with quality learning as a natural outcome of well-structured and well-paced teaching of a well-comprehended subject matter; on the contrary, they come in with an understanding that appears unnatural to their teachers. Students do indeed have some sort of understanding of subject matter from the beginning, but it is less complex, less complete and less cohesive than could be expected by the uninformed teacher. More significant is that these less complete and less cohesive understandings are rather stable and almost as many of the students complete the course with the same sort of fragmented understanding as those who enter.

The authors identify a number of pitfalls pointed out by the results, and also ways in which they could be overcome to improve students' learning. For example, while acknowledging that approaches to learning can be habitual, they add that

[T]he students' learning approach may additionally be affected by their failure to grasp the relevance of foundation material to their professional practice. This is a particularly important issue because we are trying to help them understand the topic material presented, not just in terms of concept of that field of study, but also in terms of an overarching conception of where it fits in their later professional practice. One simple way to assist improvement in overall conception could be to ask higher year students or recent graduates (with whom the younger students are perhaps more likely to identify) to come to a class and talk about why particular material is important. The issue of relevance could also be addressed by the use of case studies, which could possibly be common across several different subjects.

(2006:1902)

Thus a relatively simple data collection, inductively and deductively analysed in a team, coupled with a familiarity with the literature on related studies and thorough knowledge of the content being taught, can lead to a principled decision on changes that could be implemented in order to improve students' learning experience and outcomes of that experience. This is an example of a scholarly contribution to improving teaching for student learning, and illustrates a basic phenomenographic approach to enquiry, to which we will return.

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HOW DO STUDENTS GO ABOUT THEIR LEARNING?

The second aspect of student learning that has been extensively researched and has affected teaching practice is that of student approaches to learning (Marton *et al.* 2005). In the previous section, “surface” and “deep” approaches to learning were mentioned. A surface approach is distinguished by second-guessing the assessment that the teacher intends and can in the worst case lead to rote memorisation, and a deep approach tends to seek meaning and relate what one is learning to what one has experienced or learned before. A third approach that has been identified is the “strategic” approach, where the student strives above all to achieve good grades (Smith & Mathias 2010). It has been established that these approaches are not stable behavioural attributes but are strongly related to a student’s perception of the teaching and learning environment. The experience of student learning has been widely researched in different subject areas and pedagogical situations, and results have been exploited to improve teaching (Ramsden 2003).

Anatomy is another foundational area of study in the health sciences, though more obviously related to the business of bodily functions than is biochemistry. However, anatomy has traditionally been a hurdle for many medical students to overcome, given a highly factual presentation to be learned in a short time. Whether the subject was treated systemically – that is to say, treating first the bone system, then the muscle systems, and so on – or regionally – that is to say, bodily area by bodily area and integrated over the systems – it could become “an incoherent overload for the student” (Louw, Eizenberg & Carmichael 2009:375). As one student is quoted as saying, “Nothing encountered in second year medicine is conceptually difficult, the problem is one of quantity [...]. I found anatomy the greatest hurdle [...]. I don’t think I have ever been confronted with a more difficult subject to learn”, and another, “In two years of medicine I can only vaguely remember having to use my brain for purposes other than just memory in clinically oriented anatomy [...] the rest had to be learnt parrot-fashion” (Eizenberg 1991:186).

The work of Norman Eizenberg is that of a practising medical practitioner who also teaches anatomy and has penetrated the conditions for learning anatomy more and more deeply. He acknowledges the guidance of educational researchers and of their literature, but they could not possibly achieve the insights that he has, with his intimate knowledge of his subject. He characterised his work as action research, in which “Improving teaching represents the ‘action’ and investigating learning (from a special perspective) the ‘research’” (Eizenberg 1991:179). Such action research involved, for Eizenberg, three major cycles, of which the first cycle investigated students’ understanding of anatomy. The subsequent cycles implemented change

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in the programme and investigated what the students learned as a result. Each cycle took about two years, and in each case the research approach, the “special perspective” was that of phenomenography, investigating qualitatively distinct ways in which students experience the phenomenon of interest – the notion of anatomy, approaches to learning anatomy and the outcome of learning anatomy, being the focal phenomenon in each of the respective cycles.

Eizenberg’s enquiry into how students expressed their ways of going about learning anatomy resulted in five categories in Table 5.2 (Eizenberg 1988). They can be seen in terms of deep and surface approaches to learning, and in terms of holistic and atomistic deployment of the approach, in the right-hand columns, but now expressed in terms specific to the study of anatomy, shown in the left-hand column.

TABLE 5.2 Categories of approaches to a learning task

CATEGORY OF APPROACH	Approach to learning task	
	WHAT type of approach	HOW it is deployed
1. Search for meaning by organising the content into an integrated whole (prior to or while analysing it)	Deep	Holistically
2. Search for meaning by analysing isolated items of information (without organising them into an integrated whole until much later, if at all)	Deep	Atomistically
3. Memorise (rote learn) a ‘ready-made’ organised whole (e.g., essay plan, flow-chart, diagram, algorithm, mnemonic)	Surface	Holistically
4. Memorise isolated items of information	Surface	Atomistically
5. Avoid or not actively engage in the task	Nil	Nil

Source: Adapted from Eizenberg (1988)

Eizenberg’s “atomistic” and “holistic” approaches are clearly related to the “fragmented” and “cohesive” terms that are used by Minasian-Batmanian *et al.* to describe the prior knowledge of the biochemistry students. Eizenberg claims that the deep probing of subject matter coupled with a holistic way of going about learning, Category 1, is “the only way to gain an understanding”, while Categories 2 to 4 are found lacking in either the what or the how aspects, or both. A deep approach coupled with an atomistic deployment might relate the new knowledge to existing knowledge and seek meaning of what is being studied, but bit by bit, for example. Of course, the fifth, not engaging at all, is excluded from the notion of learning.

Based on this analysis, Eizenberg formulated a general principal, which he claims can be adapted by a teacher of any subject if he or she addresses “the peculiar combination of content, context, and students’ thinking with which they work”. For his subject of anatomy, he considers in turn “something (the content), in a certain

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way (the process) during a period of time (the stages of the programme) for a reason (the purpose) by someone (the student)" (p. 187). Let us focus on just one of these, the process. The former programme was purely "regional", and all of the regions of the body "were evenly distributed over the full complement of teaching weeks allocated to the subject", which "inadvertently promoted the accumulation of details and isolated facts" (p. 187). An alternative would have been the systemic approach in which bodily system by bodily system would have been studied. A new programme was devised in which the regional and the systemic approaches were synthesised by concentrating on all aspects of a particular major region of the body at one time, starting with the muscular-skeletal framework and going on to tracing vessels and nerves from origin to termination, and then the supplies to vascular and nerve.

As a further development of the research project, Eizenberg wrote a new textbook on anatomy, which followed his new principle of synthesising regional and systemic approaches to the subject, and he took the lead part in a highly successful interactive multi-media development for undergraduate study of anatomy, An@tomedia™, an acronym for "A New Approach to Medical Education: Developments in Anatomy" (Eizenberg, Briggs, Barker & Grkovic n.d.), which is now incorporated into another textbook (Eizenberg, Briggs, Adams & Ahern 2008).

Thus Eizenberg addressed the overall issue of his students' experience of learning anatomy, combining phenomenographic empirical research with the process of action research, and took the scholarship thereby gained directly to the students through developing more appropriate resources for teaching and learning.

WHAT DO STUDENTS UNDERSTAND AND LEARN?

The third question posed earlier as worthy of scholarly enquiry in support of teaching and learning concerns what students actually learn as a result of their studies. We can take as an example a recent study carried out in Sweden, which again takes learning anatomy as its focus (Wilhelmsson *et al.* 2010). But instead of studying students who were in the process of learning the content of anatomy, as Eizenberg did, there was a gap of three years between the relevant course of studies – this time in a traditional mode of lectures and dissections – and the enquiry that is reported. The aim was to see what had been retained after their hospital-based clinical studies. Eight medical students were interviewed in a probing manner to give as rich a picture as possible of their understanding of anatomy. They were asked to discuss how their current understanding of anatomy compared with prior understanding, how they perceived the subject and how they understood it in the light of their clinical experience.

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In an analysis of the interviews, looking specifically for qualitatively different ways in which the students spoke of understanding anatomy, four core elements were distinguished, each of which could be described as a category containing some differences related to the period of time the students spoke of. As the authors put it:

The categories listed here are to be understood as surrogate understandings, as the content of pure anatomical understanding was found problematic to define. They represent prominent patterns of thinking among the students, but should not be understood as personal since they overlap in most students. Differences in certain interpretations of studying anatomy are to be found within each category, and they are also to some extent related in the sense that they all regard anatomy from a longitudinal perspective. However, they each contain a distinct core meaning different from the others.

(Wilhelmsson *et al.* 2010:157)

The four categories can be seen in two pairs. The first is *conceptual* understanding, comprising 'Contextualisation' and 'Selection':

- *Contextualisation*, most often "in relation to other subjects, for example physiology, surgery or pathology", and which could be horizontal – "neighbouring disciplines are, therefore, needed to arrive at understanding" – or vertical – "understanding of anatomy develops through new insights that bring up new aspects of the discipline" (p. 158).
- *Selection*, in which a process of deliberate or passive rejection of some material that seems to have become irrelevant or redundant, resulting in "a condensed, compact and coherent knowledge of anatomy that is useful and accessible even later on in the medical studies: the essence of anatomy" (p. 160).

The second pair are characterised by their *perceptual* character, 'Visualisation' and 'Anatomical Language':

- *Visualisation*, which "had to do with the creation of an inner picture for grasping the anatomy and also a three-dimensional way of seeing anatomy [...] in order to be able to see through the body as with an x-ray" (p. 159).
- *Anatomical language*, in which "the name of a specific structure helps to recall its features and makes it more accessible to memory; the semantics of anatomy can be used to link together the visualised pictures held by the individual student" (p. 160).

While this particular study does not try to draw conclusions relevant for educational change or intervention, it does strongly contribute to the scholarly understanding of students' learning this difficult but foundational subject, and what sorts of productive discussions between teachers or mentors and students can support the understanding

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and memorisation of anatomical structures and details. A further point is that they also point to two dimensions of meaningfulness that emerge in the interviews, “one giving the learner a sense of relevance for the future profession and another giving the learner a sense of understanding” (p. 161). The former of these leads us into the next section of the chapter, where we take SoTL into professional practice.

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The previous section has dealt with SoTL in the context of health science studies at university, of relevance for academics who are striving to understand aspects of their own students’ learning, understanding and memorisation. But learning and teaching come under the broader umbrella of pedagogy – the striving to have someone understand something in a particular way, with an aesthetic dimension to judging whether or not such understanding has been achieved. Premack (1984) argues that pedagogy is what can generally be considered to distinguish the cultures of humans from other primates (as cited in Marton & Booth 1997), and this can be seen clearly in the health practices of the various human health cultures.

TOWARDS A THERAPEUTIC ALLIANCE

Work that illustrates the pedagogy of the health sciences well, in keeping with our general methodological approach of putting the learner’s perspective first and employing inductive qualitative research approaches, is that of Marianne Hansson Scherman and Olle Löwhagen who studied asthma and allergy sufferers over a period of eight years, seeking insights into their compliance practices (Hansson Scherman & Löwhagen 2004; Hansson Scherman, Dahlgren & Löwhagen 2002). The study began by enrolling the first 30 persons who were referred to a particular university hospital for suspected asthma and who showed the symptom of blocked airways on exposure to allergens and a positive skin prick test. The age range was broad – from students to pensioners – and they came from a wide range of socio-economic circumstances. They were, in other words, a typical set of asthma sufferers. The data collected by Hansson Scherman, a physiotherapist specialising in asthma treatment, comprised deep and open-ended interviews on entering the programme and eight years later. Fourteen different categories of experience of the illness were identified in the subsequent analysis, ranging over five themes: the concept of the illness itself; explanation of how it is caused; explaining it and its course of events; how it is to be relieved or cured; and the maintenance of identity (Hansson-Scherman *et al.* 2002).

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The category with by far the most contributors (for here ‘categories’ are not categories of individuals but of ways of experiencing which individuals express, *inter alia*) is that of “knowing for oneself”, which the authors describe as “you think that you are yourself capable of deciding when you are ill. One is ill only when one can actually feel or experience illness for oneself. Treatment is decided upon from experience, finding a way through medical, popular or personal methods of treatment” (Hansson-Scherman *et al.* 2002:299). Of the 30 patients, 21 expressed such an understanding in the first interview and 27 in the second interview after eight years. In contrast, of the eight patients in the first interview who expressed an understanding related to medical compliance only two expressed it by the time of the second interview. These two categories might be seen as opposite poles of experience, and the pedagogical issue becomes one of supporting patients in maintaining their integrity and self-identity, in line with “knowing for oneself” while at the same time encouraging their wise use of medical treatment, in line with “compliance”.

Hansson-Scherman *et al.* (2004) write: “[W]ithin the health and medical sector [compliance] generally means following a recommended treatment regimen. It is grounded in the communication between doctor and patient where the patient is obedient, trustful and passive while the doctor is paternal, authoritarian and active” (p.3), and they point out that the term is criticised as being judgmental, implying as it does that there is something wrong with patients who do not comply with their treatment. However, “compliance” is necessary for the alleviation of chronic health problems and there is a widespread desire to improve patients’ willingness to accept their medical treatments. The ideas of “concordance”, a negotiated agreement, and a “therapeutic alliance” between doctor and patient are suggested as better ways of seeing their relationship. To this end, the interviews were now analysed with a more specific question, namely how the topic of medicine was spoken of across the whole set of interviews, whether related to compliance or non-compliance. Three categories were now identified, one with subcategories, given in Table 5.3.

THE SCHOLARSHIP OF TEACHING AND LEARNING IN HIGHER EDUCATION**TABLE 5.3** Ways of experiencing medicine

CATEGORY	Examples of expression
A. Access to medicine is important to relieve discomfort and to avoid fear.	I like medicine when it helps. I wouldn't function without it. Allergy is much about being afraid, and medicine makes me unafraid.
B. Medicine damages your body and your identity without curing the illness.	When I feel reasonably well, I cut down on the medicines, because you have to look after your body, too.
B1. You can become immune or addicted.	The more medicine I take, the less it helps.
B2. The ability of the body to heal itself is weakened.	If I had started with those cortisone injections, I think I would still be taking them today.
B3. You body's own signals are camouflaged.	But if you take your medicine, you never learn your limitations and that's not good either; it's better to feel it: this is my limit.
B4. You become stigmatised.	This medical therapy is tiresome.
C. Production and distribution of medicine is a profit-seeking commercial undertaking which is not primarily aimed at curing the patient.	Since each doctor gives me different medicine, they must be influenced by something ... maybe they get some sort of kickback if they prescribe from a bigger [or] some new company ... That's the reason I don't take any medicine. I don't <i>trust</i> what's in them.

Source: Adapted from Hansson-Scherman *et al.* (2004:5-7)

The authors say of their methodological approach: "The phenomenographic approach was used in this research because the aim of phenomenography is both to survey the variation in ways of experiencing certain phenomena, and to use this variation in an educational context" (p. 7) where here the "educational context" is the clinical situation where the pedagogical relation between patient and health worker is to come into line with the "therapeutic alliance", in contrast to the relationship of passive compliance.

UNDERSTANDING COLLEAGUES' WAYS OF EXPERIENCING THE WORKING ENVIRONMENT

Another example of inquiry into the experience of professional practice concerns the ways in which surgical nurses understand technology (Barnard & Gerber 1999). This can be seen as underpinning, first, mutual understanding of the working conditions of the health science environment, second, the induction of new health professionals into the environment, and third, the relation of technology to the care of patients. Thus it concerns not only the relation between professionals and their clients but also inter-professional relationships.

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The investigation is based on 20 semi-structured interviews with surgical nurses who had spent between one and 30 years in their profession. The questions that formed the framework of the interview were open and referred to aspects of technology as they relate to nursing. The interviewees were also asked to produce a picture depicting the impact of technology on nursing, and to explain what she or he was trying to portray. The interviews plus the pictures were analysed using a phenomenographic approach.

Four major categories with a total of eight subcategories (here referred to as aspects of the major categories) were inductively derived from the data, each of which describes a level in what the authors describe as a “hierarchy of awareness” (p. 164). The first level of awareness sees technology as “machinery and equipment”, an everyday and obvious relation throughout society, saying nothing specific about the experience of the surgical nurse. The second level has two aspects: “technology as changes to skills” and “technology as increasing knowledge”, both of which are characterised as “readiness for clinical practice”. The third level of awareness focuses on “the outcome of technology use in clinical practice”, with four aspects: technology as respect and autonomy, as gaining control of clinical practice, as clinical resources of the practice environment needing to meet the needs of technology, and as including the patients’ experience and clinical presentation (pp. 163-164). The last level refers to the relation between the nurse and his or her professional practices and the need to fulfil the requirements posed by the adoption of technology (remember that this paper is from 1999), “a reciprocal relationship between nurse and technology” (p. 164). The paper has a more detailed description of each category and its aspects, including extracts from interviews and selected drawings that support the researchers’ interpretations of the data as a whole.

In the context of this chapter, the study just described can be seen as a scholarly contribution to university lecturers’ better understanding of the ways in which their students might be relating to technology they encounter in their studies, in particular during their internships and periods of clinical practice. Given such a “hierarchy of awareness”, and the more extensive descriptions of the original paper, lecturers can better determine what levels of understanding they require of their students and how they can determine where their students are located. Lecturers are more able to plan their instruction and to find nuances in their supervision of students on practice, as well as being better equipped to design revealing questions in seminars or examinations. But in addition, and maybe more importantly, it points to the needs and the demands of mentoring when new technological devices are introduced into medical and clinical practices.

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PHENOMENOGRAPHY AS A TOOL FOR THE SCHOLARLY HEALTH PROFESSIONAL, ACADEMIC OR PRACTISING

Two things that all of the scholarly studies reviewed here have in common is that, first, they focus on aspects of health science pedagogy, whether in higher education or within the related professions, and, second, they are studied with a methodological approach that has been named as ‘phenomenography’. All the papers reviewed here, and proposed as examples of the scholarship of pedagogy in the health sciences, have been carried out in collaborations between either teachers in higher education or professional health science workers and educational researchers, and phenomenography has been experienced as an appropriate approach to scholarly enquiry. While publication in international journals is not seen as a mandatory aspect of SoTL, dissemination among colleagues in a more local or regional context most certainly is (Trigwell & Shale 2004). If we look specifically at the work of Norman Eizenberg we see that he published minimally in accessible journals, but he nonetheless achieved wide dissemination while he continued with his work of researching and improving anatomy education in the role of educator, disseminating his work in specialist conferences and through the learning resources produced.

In their works on phenomenography, Bowden and Walsh (2000) and Marton and Booth (1997) take as a starting point that it is of importance to be able to understand how others understand phenomena of mutual interest, whether the teacher and her students or the health professional and his clients or colleagues. This is the fundamental starting point for scholarly enquiry into pedagogical situations. While it is a truism that everyone understands everything in their own ways, it can also be observed that teachers generally teach their material in one idealised way, and also doctors might tend to speak to their patients in one idealised way – in both cases speaking in what is considered to be the most appropriate, complete and truthful way. Phenomenography seeks to chart the qualitatively distinct ways in which people of certain classes conceptualise, or understand, or experience, phenomena of importance to them, whether central principles or theories of their studies, or features of their everyday lives such as diagnoses of illness (Marton 1981). And the phenomenographic approach is empirical, in that the investigator generates and/or collects data that reveals expressions of ways of understanding. This data is most commonly semi-structured and open-ended interviews – as in the work of Hansson-Scherman *et al.*, for example – but it can also be from open questionnaires, as for Minasian-Batmanian *et al.*, or drawings, as in Barnard and Gerber’s work, or possibly written texts and essays.

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One way of going about analysis of the data has been described in the work of Minasian-Batmanian and colleagues, where they selected a smallish number of their survey answers and analysed them individually and met together to hammer out a collective understanding, before going on to add to the selection for analysis, in an iterative process. Hansson Scherman and colleagues describe how they studied first the interview transcripts as a whole and then extracted pieces of the interviews which had clear meanings related to medication in order to form a “pool of meaning”, now separated from the individuals who uttered them. Thus the analysis moved from the whole of individuals’ utterances to parts, which are pooled across individuals, at a collective level of analysis. Differences and similarities between extracts lead to preliminary categories, which can be put back into the context of whole transcripts and judged for their completeness, until a comprehensive set of qualitatively distinct categories are arrived at – the “outcome space” of the study. Members of the team that commonly carries out such studies act as critics to one another’s work, and discussion with researchers and educators outside the team also acts as a verifier of the value of the categories. Phenomenographic results are not seen as a unique outcome, which can be judged to be true or false, but rather as a set of scholarly insights, which have value for a particular research question in a particular context; the extent to which the results can be generalised is open to discussion in the specific study.

That gives a very brief overview of the phenomenographic research approach. To summarise, such research is looking for qualitatively distinct ways in which people understand some phenomenon in their lives that is of significance for a pedagogical issue, and it proceeds on the basis of collections of utterances of one kind or another which are related to that phenomenon (Åkerlind 2005). Analysis can be seen as the investigators trying to make sense of how their subjects are making sense of the phenomenon, which is called taking a second order perspective on the phenomenon (Marton & Booth 1997:117-121), or the two-way understanding that has been called a double hermeneutic (Giddens 1987). The results of the study lie at a collective level, which is to say that individuals who offered fragments of the pool of meaning can have contributed to several categories, and no single category can be associated with any particular individuals. The resulting categories form an outcome space, reasonably ordered into a “hierarchy of awareness” as Barnard and Gerber (1999) term it, which can then be referred to the pedagogical issue.

But there are also results from other phenomenographic studies that can lead to insights and help the investigator to judge the data being worked on. The most significant of these is the qualitatively different approaches students take to their studies, characterised as deep and surface approaches (Marton & Säljö 1976;

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Marton *et al.* 2005). Such approaches do need to be re-described according to the pedagogical situation. Eizenberg (1988) described them in four categories, apart from a non-engagement category (Table 5.3), and he characterised them as atomistic or holistic as well as deep and surface. Hansson Scherman and Löwhagen did not use the notion of an approach to the situation, but compliance could actually be seen as a surface approach to medication, since it is accepting the word of the doctor, while other – less effective and less medically approved – approaches could be seen as making personal meaning of the situation for the patient involved – thus speaking for the “therapeutic alliance” where both patient and health professionals strive to reach a mutually agreed, and medically effective, understanding of the situation.

There are numerous studies that can be characterised as either SoTL in health sciences higher education, or as the scholarship of pedagogy in the practice of the health sciences which have a phenomenographic approach. Most of these come from the Scandinavian countries and from Australia, where phenomenography has had greatest impact on pedagogical research. In addition to the few treated here, Dall’Alba has studied the experience of becoming a medical practitioner from the perspective of how entering students characterise medical practice (Dall’Alba 1998), and how the pre-medical programme prepares students for clinical practice (Dall’Alba 2002). Phenomenography has come into focus for nursing education, for example a study of graduating nurses’ understanding of competence (Ramritu & Barnard 2001), as well as a consideration of the phenomenographic view of knowledge for nurse education (Cust 1996).

There is a breadth of study with a phenomenographic approach related to healthcare practice carried in journals with a wide variety of focus. Studies are to be found from women’s experience of physical activity following breast cancer treatment (Larsson, Jönsson, Olsson, Gard & Johansson 2008) to nurses’ perceptions of thirst in patients on mechanical ventilation (Landström, Rehn & Frisman 2009), and from understandings of diabetes care held by health professionals (Holmström, Halford & Rosenqvist 2003) to women patients’ conceptions of integrity within health care (Widäng, Fridlund & Mårtensson 2007). Aronsson *et al.* (in press) have studied how health science students at the end of their programmes of study integrate pharmacodynamics, pharmacokinetics and drug interactions in their consideration of typical case presentations in practice, and Zetterqvist *et al.* (in press) have studied communication competences of the same students.

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I will conclude this section with a quotation from a paper on applying phenomenography in nursing research:

We argue that the relative strength of phenomenographic studies in this area lies in their emphasis on variation between patients or students as regards their ways of experiencing and conceiving the world around them. One of the most difficult problems in the health care sector, as well as in education, is the fact that humans do vary in their experiencing and thinking about themselves and the surrounding world. In the context of health care, it is also a fact that patients react to diseases and injuries, to medication and other kinds of treatment in different ways. In many cases this excludes any routine-based dialogues with and treatment of patients. Rather, it is important that examination, diagnosing and treatment of all patients is based on considerations of the vast differences between people. The phenomenographic approach may supply the disciplines of nursing and nursing education with knowledge about variations in how patients, nurses and students think, but especially the structural and content aspects of how phenomena are experienced in nursing situations. The availability of content-related descriptions of a group of people's perceptions of core professional settings is in itself a resource for enhancing awareness.

(Sjöström & Dahlgren 2002:344)

CONCLUSION

In this chapter I have attempted to give some insights into the possibilities for scholarly work on pedagogy in the health sciences and an outline of what it takes and what it means to take a scholarly approach to pedagogical issues, an approach that can be grounded in a sound methodology – phenomenography – and lead to insights that support better understanding and thence improvement. Health scientists have the dual role of educators to teach new generations of health workers and educators to support the effective care of patients, clients and colleagues, and the notion of a scholarly approach is hardly alien in either case. But the move from reflection over puzzling cases to the design of studies and undertaking analysis requires a suitable methodological approach. In the examples given here I have tried to build up an understanding of the phenomenographic research approach in the context of health science education, and the interested (hopefully inspired) reader can find numerous further examples in the literature, as well as extending their understanding by reference to the classic works in the field.

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