Short Report

The Development of Excellence in Pharmaceutical Knowledge: New Curriculum for the B.Sc. (Pharmacy) Studies

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Reflective action is an important factor in the learning process and life-long learning. Enhancing the development of students' metacognitive skills should be an important goal in the implementation of pharmacy education. In Finland, a new curriculum for B.Sc. (Pharmacy) studies was designed to meet the expectations of working life and form a solid base for the development of pharmaceutical expertise and life-long learning. The new curriculum was especially aimed at integrating theoretical knowledge with practice and fostering students' learning and deep-level understanding. The selection criteria of the students and the structure of the curriculum were developed from the traditional curriculum. The active role of the students was increased with different learning tasks. This follow-up study was designed to evaluate the successfulness of the new curriculum and to explore students' expectations and realization of them during their studies. As a whole, the implementation of the new curriculum succeeded well. The results, however, clearly indicated that certain areas should be developed further. Attention should be paid as to how to promote the active role and motivation of students. Only by understanding the multiple dimensions of learning and teaching and by seeing the university teaching as a holistic phenomenon can it be possible to increase the quality of higher education and produce pharmacy experts who are likely to succeed in and act as active developers of the ever-changing working life.

Keywords: Curriculum; Life-long learning; Metacognitive skills; Motivation; Pharmacy education

INTRODUCTION

The work and the role of pharmacists have changed rapidly over the last decades. Today's pharmacists should continuously develop their expertise in order to succeed in their ever-changing working life and fulfil the demands of society. These demands also challenge the education of pharmacists. It is not possible to manage the change and new demands without proper education for it.

At the moment many pharmacists and pharmacy students in Finland have problems in facing the challenges of the working life and in applying their theoretical knowledge in practical situations and patient counselling (e.g. Sihvo and Hemminki, 1999; Sihvo *et al.*, 2000; Katajavuori *et al.*, 2002). Furthermore, the role of the pharmacist as a part of the healthcare chain seems to need clarification. More cooperation should be established between the healthcare organizations and pharmacies (Närhi, 2001; Rajamäki *et al.*, 2002). There is also an acute lack of pharmacists (B.Sc.) in Finland; about 50% of the graduating students end up working full-time in community pharmacies (Kause, 2002; Loponen, 2002). Taking into account these developments, it is extremely important to evaluate and restructure the whole curriculum of the pharmacy studies.

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The IPSF (International Pharmacy Students Federation) statement regarding good pharmaceutical education practice emphasises the expert-role of pharmacists: research of pharmaceutical knowledge, understanding of information, importance of critical thinking, good information-processing skills and positive attitude towards life-long learning (IPSF, 2003). The challenge of higher education is to enable the students to develop knowledge and skills for an unknown future. This means that the graduates must be able to perform in circumstances that cannot be described in advance. In addition to the knowledge and skills at the time of graduation, students must also possess learning potential, good knowledge-processing skills and a positive attitude towards life-long learning. This learning potential also advances students' practices and their professional role in society (Bowden and Marton, 1998). In addition, education should be effective and cost-effective and, further, it should give tools for practical work (Zapp, 2001).

Metacognition, or thinking about thinking, plays a central role in life-long learning. Metacognition has a significant role in the development of critical thinking and expertise because it entails an awareness of one's own cognitive processes and includes skills to assess learning and knowledge and, further, to reflect on one's behaviour (Cowan, 1998). Reflective action is important in the learning process and in continuous development in the working life (Cowan, 1998). Thus, enhancing the development of students' metacognitive skills should be an important goal in the implementation of pharmacy education. Important aspects of metacognitive behaviour are the motivation and interest of the students. In long-term activities like education, motivation is characterised by a regular (re)appraisal and balancing of the various internal and external influences to which the individuals are exposed, resulting in a somewhat fluctuating pattern of effort and commitment (Dörnyei, 2000). Thus, students' interest towards the studies and learning is a good starting point for improving their metacognitive skills and for the deep-level understanding and learning (Prosser and Trigwell, 1999; Barron and Harackiewicz, 2000).

The "additional modified education of pharmacists" (referred to hereafter as the "new curriculum") was set up in Finland in 2001 to relieve the shortage of labour in community pharmacies. The new curriculum was funded by the European Social Foundation and the State Provincial office in Western Finland. The Department of Pharmacy at the University of Helsinki conducted this education and the Palmenia Centre for Research and Continuing Education was responsible for the administration of the project. The new B.Sc. (Pharmacy) curriculum was designed to meet the current challenges of the community pharmacies and form a solid base for the development of pharmaceutical expertise and life-long learning. In the present study, the new curriculum and implementations that were carried out are described. Additionally, the new curriculum, according to the follow-up results, expectations, experiences and evaluations by the students, is evaluated.

THE NEW PHARMACY CURRICULUM

Student Selection

The new curriculum started in February, 2001. Altogether, 50 students were selected for this programme. The selection procedure (Fig. 1) was different from the traditional entrance examination in that its aim was to select those students who would most probably end up working in community pharmacies. The selection criteria were based on the grades achieved from an earlier degree (a non-academic degree in pharmacy or healthcare or an academic degree in natural sciences) and the working experience in a pharmacy, a hospital pharmacy or the pharmaceutical industry. In total, 752 applications were received. At the second stage, the best applicants (10%, $n = 75$) were invited to a personal interview that was carried out by three university teachers. The interviewers were interested in students' motivations to study pharmacy and their general interest on a career in a community pharmacy. The age variation of the selected students was from 23 to 58 years. Educational background varied as well; 41% ($n = 20$) of the students were pharmacy assistants while an additional 41% were nurses. The rest of the selected students were laboratory assistants (8%, $n = 4$) or other healthcare professionals (10%, $n = 6$). The traditional student selection procedure in the Department of Pharmacy is based on an entrance examination that includes 100 multiple choice questions from a book of Human Anatomy and Physiology and an essay question that needs to be answered after studying a previously unknown text for 30 min. This examination measures the applicants' deep-level text comprehension, deep-level critical thinking skills and their ability to tolerate pressure during the entrance examination.

The Curriculum and Learning Environment

Several content-related and structural implementations were included in the new curriculum in order to foster the development of students' metacognitive and problem-solving skills and to enhance learning. The curriculum was shaped around, and placed an emphasis on teaching methods because they

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┌─────────────────────────────────────┐
│           First stage:              │
│                                     │
│      Degree and work experience     │
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┌──────────────────────────────┐        ┌──────────────────────────────┐
│ Former education, max 10 points│  +    │ Work experience in a pharmaceutical│
│                                │       │   environment, max 5 points    │
│ Based on the grades in the     │       │ 1-3 months (1p.), 3-6mo. (2p.), 6-12 mo.│
│ diploma of the earlier degree  │       │ (3p.), 1-2 years (4p.), > 2 yrs. (5p.)│
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│           Second stage:             │
│                                     │
│    Personal interview, max 5        │
│    points                           │
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┌─────────────────────────────────────┐
│ Max points 20                       │
│ 50 students were selected on the basis│
│ of total points of former education +│
│ work experience + interview         │
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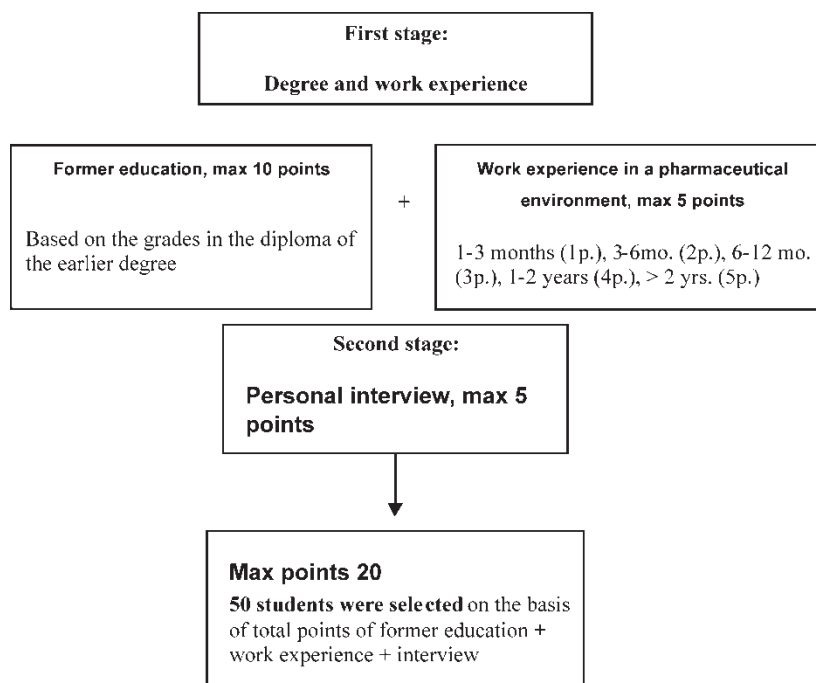
FIGURE 1   Student selection for the new pharmacy curriculum.

significantly affect how the students study and learn (Knowles, 1984; Biggs, 1999; Lindblom-Ylänne, 1999). Figure 2 summarises the new implementations.

There are two distinct approaches to teach cognitive and metacognitive skills: adjunct and metacurricular. The adjunct approach aims at teaching cognitive and metacognitive skills as separate subjects (Weinstein and Meyer, 1994). The traditional curriculum in pharmacy proceeds by teaching separate and detailed study courses first, followed by studies towards more general principles. Thus, it could be interpreted that the traditional curriculum in pharmacy represents an adjunct approach (Fig. 3). The traditional approach may cause problems for students, because finding a practical link between the fragmented studies and the working life is difficult (Entwistle, 1981). Furthermore, students may have problems in relating different elements of pharmacy education with each other (Hyvönen and Lähdevuori, 2001). When instruction concentrates on detailed and specific knowledge, it is difficult to form a coherent picture of the studies (Brown *et al.*, 1989; Crawford *et al.*, 1998).
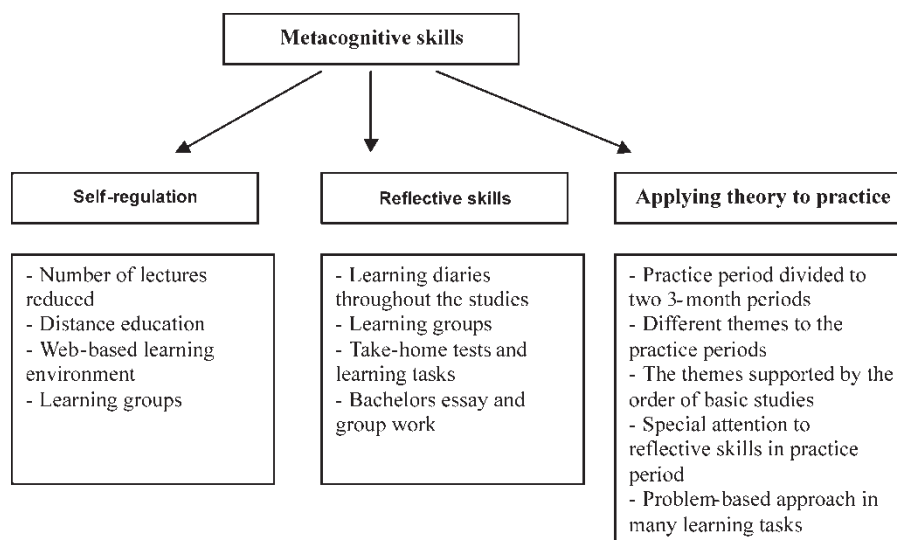
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│    Metacognitive skills     │
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│  Self-regulation │  │ Reflective skills│  │ Applying theory to practice│
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┌──────────────────┐  ┌──────────────────┐  ┌──────────────────────────┐
│ - Number of      │  │ - Learning diaries│  │ - Practice period divided to│
│ lectures reduced │  │ throughout the   │  │ two 3-month periods      │
│ - Distance       │  │ studies          │  │ - Different themes to the│
│ education        │  │ - Learning groups│  │ practice periods         │
│ - Web-based      │  │ - Take-home tests│  │ - The themes supported by the│
│ learning         │  │ and learning tasks│  │ order of basic studies   │
│ environment      │  │ - Bachelors essay│  │ - Special attention to   │
│ - Learning groups│  │ and group work   │  │ reflective skills in practice│
│                  │  │                  │  │ period                   │
│                  │  │                  │  │ - Problem-based approach in│
│                  │  │                  │  │ many learning tasks      │
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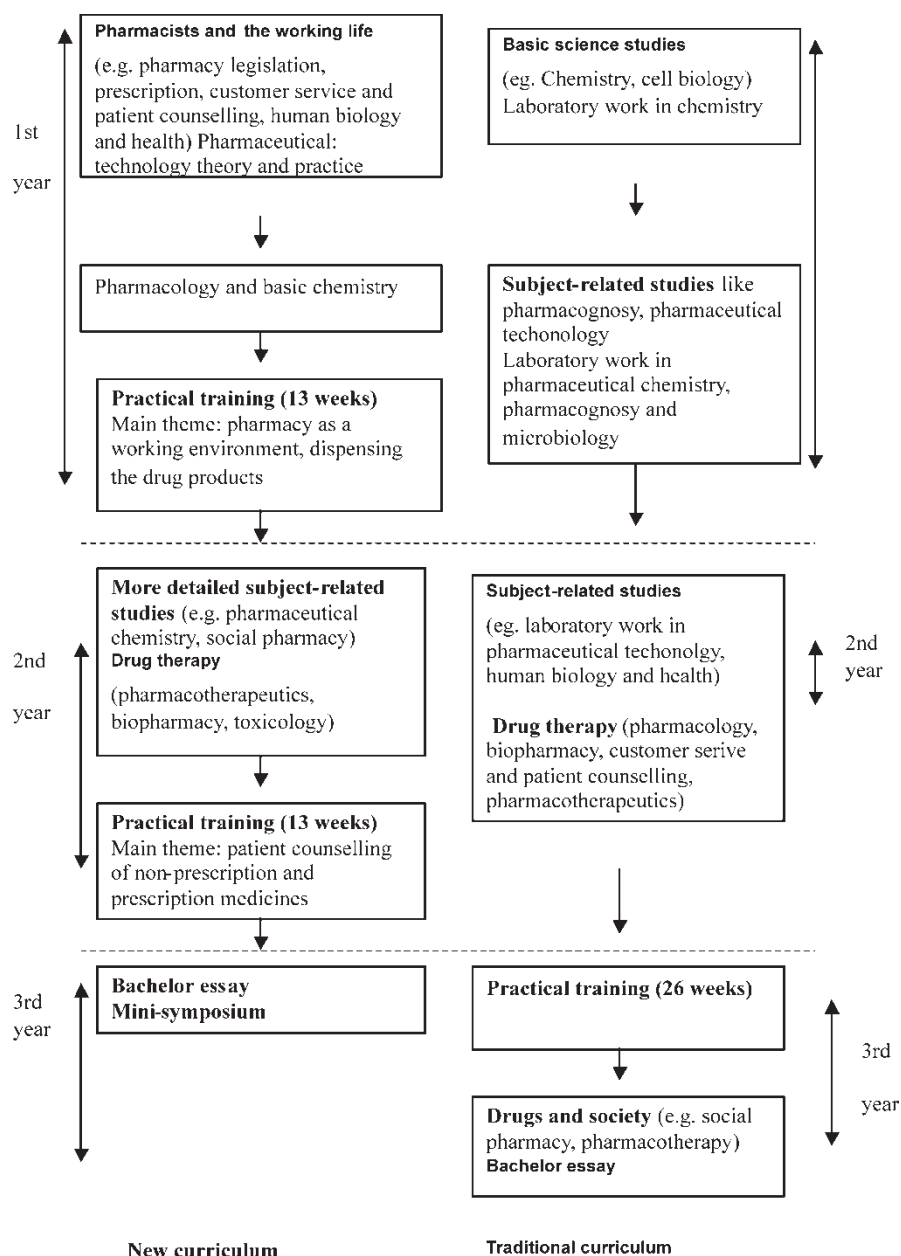FIGURE 2   Methods, which were aimed at improving students' metacognitive skills.

FIGURE 3 Comparison between the new and traditional curriculum.

The metacurricular approach, on the other hand, involves the teaching of appropriate cognitive and metacognitive skills along with the content, which facilitates learning and application of the skills. This approach further enhances the awareness of aspects related to effective learning and the ability to apply metacognitive skills in meaningful ways in different situations (Weinstein and Meyer, 1994). For effective learning to occur, contextualization of knowledge and a prioritised teaching of content-structuring materials is needed (Brown *et al.*, 1989; Beishuizen *et al.*, 1994). The new curriculum may be seen as an attempt towards the metacurricular approach. To foster students' learning through formation of a solid knowledge base and students'

deeper understanding of theoretical knowledge, the studies in the new curriculum proceeded from general subjects into more detailed knowledge (Fig. 3). The aim was to create a general overview of community pharmacies and the work of pharmacists; this would help the students form a solid knowledge base (Brown *et al.*, 1989; Crawford *et al.*, 1998). Furthermore, the new curriculum aimed at integrating theoretical knowledge with practice. Practical links may foster the understanding of theoretical backgrounds. Practical skills are learned more easily if they are closely related to theoretical knowledge. On the other hand, a deep understanding of knowledge also helps an individual face the practical challenges

(Nonaka and Takeuchi, 1995; Bowden and Marton, 1998). In Finland, a 6-month practical training has a central role in the B.Sc. (Pharmacy) studies. Normally, the practice period takes place at the end of studies. In the new curriculum the training period was divided in two separate 3-month periods (Fig. 3). The first period took place after 1 year of theoretical studies and was concentrated on general pharmacy practices and drug preparation. The second period took place after the second year and concentrated on patient counselling.

Self-reflection and self-regulation play central roles in metacognitive action (Cowan, 1998; Vermunt, 1998). To foster the development of self-regulation skills in the students, the amount of lectures in the new curriculum was reduced by 50% as compared to the traditional curriculum (Fig. 2). The students were expected to take an active role in the individual and group exercises and, of course, in the distance education at home. Students were encouraged to form learning groups in order to get support from peers. In groups it is possible to analyse what has been learned as well as to compare ideas and questions related to the study material. Social interaction and group discussions may help students to convert their tacit knowledge to explicit knowledge (Glaser, 1991; Staudinger, 1996; Pedley and Arber, 1997).

Obviously, the discipline affects the teaching methods. It may be difficult to teach abstract issues by using methods that emphasize self-reflection (Schlommer *et al.*, 1997). However, by using different teaching approaches, it is possible to challenge the students to reflect on their learning and to adopt the idea of life-long learning.

Assessment of Learning

An important factor in a learning process is assessment, which strongly guides the learning and is thus sometimes referred to as the hidden curriculum (Godfrey, 1995; van der Vleuten, 1996; Lindblom-Ylänne, 1999). Inappropriate assessment tasks allow the students to get a good mark on the basis of memorizing facts (Biggs, 1999). Instead of reproducing the information, understanding should be highlighted in the assessment. Various types of examinations, such as take-home examinations, group essays and project works and material-based examinations, were introduced in the new curriculum and, correspondingly, the number of traditional examinations (direct questions, multiple-choice exams) were reduced. The learning tasks and examinations were designed to be more multi-dimensional and complex than the traditional examinations. Emphasis was put on the understanding and application of knowledge, which fosters the deep-level learning (Brown *et al.*, 1997).

To help the students formulate wide concepts in the field of pharmacy, special attention was paid to the bachelor's thesis. The same theme, diabetes, was chosen for all the 50 theses (each student had an individual title of the thesis) in order to show that it is possible to approach a subject from different viewpoints. At the end of the studies, a mini symposium on the diabetes theme was organised with expert lectures, students' oral presentations and a poster exhibition.

To evaluate the implementation and the outcomes of the new curriculum, evaluative research was conducted to clarify the effect of the implementations and to explore how the pharmaceutical expertise was constructed among the students. The main aim of this study was to assess the new curriculum and its implementations from the students' point of view: their expectations and realization of them during the studies. The first aim was to analyse, based on the background of the students, the motives, goals and expectations the students had for their studies. Secondly, it was assessed how the curriculum corresponded to these expectations by exploring students' experiences of the studies.

MATERIALS AND METHODS

This study was conducted by collecting data at the beginning and at the end of the B.Sc. studies. Students' motivation to study, goals and expectations for the future work were clarified by a questionnaire at the beginning of studies. Open-ended questions (for example, "Why did you apply to study pharmacy?" and "What kind of expectations do you have towards the studies?") were used to ensure that the students could express their attitudes and motives through their own words. The questionnaires were sent to all the admitted 50 students before the onset of studies. Of these, 49 students returned the questionnaire during the first day of studies, February 5th, 2001. In the end of studies **(February, 2003), the same students were given a new questionnaire. It consisted of both structured and open-ended questions regarding students' experiences, their evaluations of how they had achieved their goals and what kind of expectations they had for working life as a pharmacist.

The answers to the open-ended questions were analysed by qualitative content analysis; the categories were elicited from the data. The results concerning the categories formed are shown quantitatively (Chi, 1997; Priest *et al.*, 2002) and the descriptions of the categories are shown in Tables I–VII. The answers were analysed by using SPSS statistical software (v11.0) by frequencies and cross tabulations. The level of significance was tested by chi square tests. Crosstables were used to analyse whether there were associations between

TABLE I   Motives to study pharmacy (altogether 92 comments)

Reasons to apply	Description of the category	%	f
General interest	General interest towards pharmacy, or pharmacist's work	34	31
Possibility for a good job	Possibility to have work/ permanent work, change for the current work and hope for a better work	27	25
Personal development	Willingness to learn, study and develop oneself or to promote one's career	13	12
Previous education	Possibility to combine the former education to the pharmacy studies and working life	15	14
New curriculum	Possibility to study in the new curriculum	11	10
Total		100	92

TABLE III   Goals for the studies (altogether 71 comments)

Goals for the studies	Description of the category	%	f
Graduation	To graduate as a pharmacist and to be able to graduate in time (Spring 2003)	25	18
Learning	To learn and understand the study issues in order to become a good pharmacist	24	17
Manage the studies	To go through the studies, and to be able to pass the exams	21	15
Success in the studies	To succeed in the studies, to get as good grades as possible	20	14
To overcome one's limits	To win the challenge of studying in order to be able to be proud of oneself	10	7
Total		100	71

the motives, expectations and goals of the students to the age and educational background of the students. For crosstables, the students were grouped in three categories according to their age at the beginning of studies: under 30 years ($n = 19$), 30–45 years ($n = 19$) and over 45 years ($n = 11$). For exploring the significance of educational background two groups were formed, one consisting of the students with a pharmaceutical assistant background ($n = 19$) and the other of students with a healthcare background or other education ($n = 29$). These groups were formed to clarify whether the pharmacy-related educational background and the other educational background affected the expectations and development of the students.

RESULTS

Motives and Expectations

Altogether, students gave 92 comments regarding their motives to study for the degree of B.Sc.

TABLE II   Expectations and wishes for the studies (altogether 98 comments)

Expectations and wishes for the studies	Description of the category	%	f
Hard work	Studying would be hard work, students were worried about how to manage the studies	23.5	23
Knowledge	Wish to learn new things, gain knowledge of pharmacy and a good basis for the work	23.5	23
Rewarding teaching and learning	Good and versatile teaching, rewarding, interesting and challenging studies	20.5	20
Expertise for practice	Studies would give a good knowledge base for working as an expert in pharmacy and would train for professionalism	18.5	18
Application of knowledge	The studies would concentrate on practical issues, and on those courses which are needed in pharmacists' work	14	14
Total		100	98

TABLE IV   Students' comments of their expectations regarding the work of pharmacist (altogether 115 comments)

Expectations	Description of the category	%	f
Work	To find work or permanent work, possibility for different jobs	30	35
Challenging work	Challenging, versatile, responsible and precise work	26	30
Customers	Customer-centred work, customer service and counselling	17	19
Personal development	Continuous learning, continuous development, exploiting the former knowledge to the work of pharmacist	18	20
Working environment	Good and inspiring working environment	6	7
Drug preparing	Importance of being able to prepare drugs	3	4
Total		100	115

TABLE V Students' comments concerning the skills, which are important in the work of pharmacist (altogether 133 comments)

Skill	Description	%	f
Interaction skills	Good skills to interact and communicate in customer service and skills to interact with workmates	29	39
Drug knowledge and counselling	Wide and good knowledge base of medicines and their effects, knowledge of how to counsel customers, skills to give drug information	28	37
Responsibility	Responsible behaviour, responsibility of the work, skills and knowledge	19	25
Technical expertise	Good skills in technical issues like with computers, prescription handling process, and in drug preparation	16	21
Wide knowledge base	Have wide knowledge base and expertise about, for example, of health, diseases and anatomy	8	11
Total		100	133

TABLE VI Goals, which were achieved during the education (altogether 61 comments)

Goal	Description of the category	f	%
Graduate	To be able to graduate according to the timetable	18	30
Go through	To be able to pass the education, courses and exams	17	28
Learn	Learning a lot of new things, learning how to learn	11	18
Application of knowledge	Learning a lot of things that can be applied to practice, learning the tools for the work as a pharmacist	8	13
Succeed	Good performance in the studies, to be able to succeed and win oneself in the studies	7	11
Total		61	100

TABLE VII Expectations and goals for the work-life as a pharmacist (altogether 118 comments)

Expectation	Description of the category	f	%
Life-long learning	Continuous learning and development, constant deepening of one's knowledge and learning new things	35	30
Professionalism	To be able to work as an expert pharmacist with expert knowledge, to be able to give expert counselling and service	29	25
Challenging work	A challenging and interesting work	26	22
Working environment	To work in a good and dynamic working environment, to have a work where the continuing education is promoted	17	14
Work	To have work or permanent work as a pharmacist	11	9
Total		118	100

(pharmacy) (Table I). About one third had applied to this education because they were interested in the field of pharmacy. A good chance to achieve a permanent job was the motive for 27% of the students. The other reasons included a wish to make use of one's former education through studies and working life and the anticipation of the students to deepen their previous knowledge and develop new skills. The new curriculum was also a motive to apply to study for 11% of the students (Table I).

Students had several expectations towards the studies (Table II). Most of the comments were concentrated on the hardships of studying or expectations to learn new things in pharmacy. Students also expected good and rewarding teaching and learning or they hoped that the university studies would support their development towards expertise in pharmacy (Table II). A small portion of the comments was related to an expectation that the pharmacy studies would be useful in the working life.

The goals the students had set for their studies formed five categories (Table III). One fourth of the goals were related to graduation and one fourth to learning and understanding the theoretical studies. Other goals were related to going through the studies or to succeeding in the studies. The fifth category consisted of comments regarding the studies as a challenge; these students wanted to exceed their own expectations.

Students' expectations of the work as pharmacists formed six categories (Table IV). Most of the comments were concentrated on an expectation to find a job as a pharmacist or to get a challenging job. One fifth of the comments were related to continuous development and another fifth expected work with customers and patient counselling. Only three percent of the comments were related to preparation of drugs (Table IV).

Students were next asked which skills they thought were required of a pharmacist (Table V). Almost one third of the comments were related to interaction skills or patient counselling skills and

knowledge about drugs. One fifth of the comments were related to conscientious behaviour. Technical skills and a wide knowledge base were also considered important (Table V).

Cross-table analyses were conducted to clarify the relations between the educational background or age and motives to study, expectations to the studies, goals expressed towards the studies and expectations concerning the work as a pharmacist. Significant connections were found between the six different dimensions. Firstly, the educational background was related to students' expectations regarding the studies. Students with healthcare backgrounds expected significantly more often than the pharmaceutical assistants that the studies would give them a basis for acting as an expert in pharmacy ($p = 0.012$). A significant relation was also found about the students' motives to apply for the studies. Students with healthcare education mentioned significantly more often the possibility of using their former knowledge and education in pharmacy rather than pharmaceutical assisting ($p = 0.021$). Students with a healthcare background expected significantly more often to find a permanent job as a pharmacist rather than as a pharmaceutical assistant ($p = 0.025$). Furthermore, the nurses and alike anticipated, significantly more often than pharmaceutical assistants ($p = 0.034$), that their work would involve continuous learning and development of oneself.

A clear association was also found between the age and the possibility to use the former education in the studies. The oldest students (over 40 years of age, $n = 11$) mentioned former education significantly more often ($p = 0.008$) than the youngest students (under 30 years of age, $n = 19$). The young students expected that the teaching and learning would be rewarding significantly more often than the old students ($p = 0.006$).

Results in the End of the Studies

In general, the new curriculum turned out to be successful. One student did not start the new curriculum and another gave up the studies after 5 months. After 2 years of studies (March, 2003), 19% of the students ($n = 9$) graduated the new curriculum. Altogether, 83% of the students ($n = 40$) are expected to graduate during the spring of 2003. The remaining students will graduate in the autumn of 2003. The majority (82%) of the students plan to work in a community pharmacy after the graduation and 10% in the pharmaceutical industry. Two students had no definitive plan as to where they were going to work.

Students gave, altogether, 54 comments about the goals they had achieved during their studies (Table VI). Almost one third of the comments related

to the goal to graduate or to go through the studies had been achieved. The other comments mentioned the learning and applicability of studies (Table VI). The fifth category consisted of comments concerning the successful nature of the studies.

Students' expectations and goals towards the working life as a pharmacist formed five categories (Table VII). One third of the comments mentioned "life-long learning," one fourth "professionalism" and one fifth "challenging work." The two other categories were expectations regarding a good and inspiring working environment or, simply, the finding of a job.

Though the association between the age and educational background was also tested with the goals achieved and pharmacist working life expectations, no significant associations were found.

DISCUSSION AND CONCLUSIONS

Evaluation of the New Curriculum

The starting point of the new curriculum was to relieve the labour shortage in community pharmacies and to select those students who would be interested in the work of a community pharmacist. These goals were well achieved as the majority of students planned to work in community pharmacies.

Working experience in a field of pharmacy and previous education in healthcare or pharmacy turned out to be good selection criteria. Due to the pharmaceutical working experience, they knew what they were aiming for in their studies. The results indicated that the students were committed to their studies. Students were prepared for hard work and both their motivation to study and their expectations towards their studies were on a high level. This was important because, especially in this new curriculum, a high motivation and interest towards the studies were truly needed. The follow-up results at the end of the studies indicated that the devotion to the studies continued during the whole curriculum; almost all the students are graduating according to the demanding timetable.

Students' expectations, commitment and motivation were not the only reasons for succeeding; the new curriculum also seemed to foster the students' learning and devotion to this education. The general structure of education seemed to be a reason for this. Students' expectations about the studies were well met because the general pharmacy practices and customer-perspectives of current work-life were introduced to them from the beginning of studies. Understanding the general aspects of studies is also associated with deep-level learning (Bowden and Marton, 1998; Crawford *et al.*, 1998). The students

succeeded well in their studies and the teachers were mainly pleased with the students' performance. The other reason for fostering the learning and devotion to the studies seemed to be the practice period, which was conducted earlier than normal. It fostered the students' learning and increased their motivation to study and learn the more theoretical courses. The implementation and successfulness of the practice period will be analysed in more detail in a separate article.

Motivation

The results emphasised the importance of study motivation for successful learning. The importance of students' study motivation should always be taken into account in higher education, because the motivation to study is related to learning: how students commit to their studies, what kind of goals they set for themselves and what subjects they consider to be important in studying (Butler, 2000; Dörnyei, 2000). In this research, the reason for the students to apply to study the B.Sc. degree in pharmacy was most often either an interest in pharmacy and pharmacist's work or a hope for a better or a permanent job. These reasons have presumably been great motivators for the students to graduate. Students in this curriculum were interested in developing themselves, which means that they were orientated towards their own development (Beaty *et al.*, 1997). They were also willing to develop their knowledge and skills and to learn, which has been entitled as a meaning-orientated attitude towards the studies (Vermunt, 1998). The results were in line with previous research (Riveiro *et al.*, 2001): when students are interested in and motivated to study, they are likely to be self-regulated and succeed in their studies.

Students expected that the studies would include a strong practical point of view. They also expected to form a good knowledge base for working as an expert pharmacist. This kind of vocationally orientated attitude towards studies (Beaty *et al.*, 1997) may be emphasised due to the students' background and working history. Further, it is possible that this kind of professional orientation is common to students in sciences. Lonka and Lindblom-Ylänne (1996) have shown the strong professional orientation of medical students, which they called a "cook-book approach" (Lonka *et al.*, 2001, a paper presented at the 9th EARLI Conference, Fribourg, Switzerland, 2001). This approach may lead to confrontation with theory and practice, because the practical point of view strongly guides the learning of students. This, in turn, may hinder the theoretical learning (Lonka and Lindblom-Ylänne, 1996).

Medical and pharmaceutical studies have strong resemblance; both are applied natural sciences and the studies are closely related to profession. Thus, the danger of cook-book approach should be recognised in pharmacy education. It would be important to justify the meaning of theoretical studies from the practical point of view. For students who consider the practice to be the most important goal, it would be important that teaching would stress meaningful learning that is applied to real-world problems. Anchoring the knowledge in practice may also foster the learning (Hounsell, 1997). It seems that the structure of the new pharmacy curriculum was successful; it introduced the practical and content-related studies first and, in that way, reduced the potential confrontation with the theory and practice.

Goals and Study Orientation

Goals and goal setting play a central role in self-regulation, learning and motivation. Thus, goals can play an important role in increasing student competence (Alderman, 1999). The main goals for most of this study's students were, on one hand, to either graduate or graduate on time and, on the other hand, to learn during their studies and apply this knowledge in practice. These students are primarily interested in attaining mastery and improving their knowledge or competence (Riveiro *et al.*, 2001). Some students were uncertain of their ability to manage the studies, hoping to merely pass through them. This may result from the fact that many had been in the working life many years after the previous degree. Some students were more certain of their skills and set their goals higher: they wanted to succeed in their studies.

Both the students' motives and goals show that they had intrinsic motivation towards the studies; they were interested in pharmacy and pharmaceutical studies and they were motivated to learn. Intrinsic motivation is associated with deep-level orientation and may foster the students' interest and further involvement in the course material (Barron and Harackiewicz, 2000). When a student has a desire to learn and when he or she is self-regulated, it is more likely that the theoretical knowledge is also learned with understanding (Prosser and Trigwell, 1999).

Students also held an extrinsic motivation towards the studies; they were motivated to succeed in their studies and graduate (Barron and Harackiewicz, 2000). Pure extrinsic motivation may lead to reproductive orientation, which, in turn, may lead to difficulties in performance in practical situations (Bowden and Marton, 1998; Barron and Harackiewicz, 2000). Thus, for successful learning, in addition to the extrinsic motivation, intrinsic motivation and goals or willingness to learn and understand the theory are needed (Purdie and Hattie, 1995). Previous studies have shown that

today's community pharmacists have problems in everyday work (for example, Sihvo and Hemminki, 1999; Sihvo *et al.*, 2000). Therefore, it would be important that success in pharmacy studies would result only after the theoretical backgrounds are understood. Further, students' intrinsic motivation should be supported by challenging studies, which allow the students to develop their skills and deepen their knowledge. Assessment should emphasise the understanding and applicability of knowledge (Ramsden, 1997), which could, in turn, foster the deep-level learning.

Teachers have been pleased with the students' performance in this education. The grades have been good and the students committed to their studies. Students themselves assessed that the goals they had achieved were graduation and passing through the courses, which could be interpreted to reflect extrinsic motivation. At the end of studies the amount of comments regarding learning and succeeding was smaller than at the beginning. However, at the end of the studies a new category, "applicability," was formed. Students commented that they had learned a lot of the theoretical background that could be applied in practical tasks as a pharmacist. These comments could be interpreted to originate from intrinsic motivation. Overall, the goals achieved during the studies are difficult to assess and these aspects will be analysed in more detail in the future.

By asking the students to think about their goals and study motivation, it is possible to emphasise the active role of students and to encourage them to take responsibility over their studies. When a student becomes involved with a goal and when the goal becomes important to the student, he or she tends to direct their action according to the goal (Alderman, 1999). The teachers could also use this goal information in planning the teaching. Goals, in which a student targets only the passing of courses or gaining the minimum knowledge, may indicate that this student has a reproducing orientation towards their studies, which does not foster deep-level learning or success in study performance (Purdie and Hattie, 1995). When faced with this kind of orientation, teachers could activate the students and emphasise the application of knowledge, which would then be related to understanding (Hounsell, 1997; Vermunt, 1998).

Bachelor's education in pharmacy is short and, therefore, it is important to affect to students' learning. A Finnish study about pharmacy students (Nieminen *et al.*, 2003, sent for publication) indicated the importance of recognizing students with reproductive orientation (usually associated with low study-success) and to then encourage them to see the benefits of meaning-oriented and self-regulated learning. Here, the information of goals and expectations towards the studies could be used as an indicator of students' orientations. By designing a good learning environment, it is possible to promote meaningful, active and increasingly self-regulated learning. The development of student learning should be a central concern in pharmaceutical expertise, where the ability to evaluate, apply and communicate the scientific knowledge is the core of professional work (Nieminen *et al.*, 2003).

Continuous Learning is Important

At the beginning of studies the students' expectations concerning the pharmacists' work corresponded to the new role of pharmacists. Students most often expected the work to be customer-centred patient counselling and to require continuous learning. Only a few comments reflected the more traditional conception of pharmaceutical work. The new role of pharmacists also requires the education of pharmacists to emphasise more the customer perspective, including patient counselling and a wide knowledge base.

Nurses and the like expected that the work of pharmacists would require continuous learning and development more often than the pharmacy assistants themselves—an intriguing result. Furthermore, the students with a healthcare background expected to achieve an expert base from the studies, while the pharmaceutical assistants, who had previous education in the pharmaceutical field and possessed significantly longer working experience in pharmacies, did not. In addition, the pharmaceutical assistants did not mention the possibility to make use of their education as often as the students with a healthcare background. It is worth considering why the pharmaceutical assistants had such a different conception of the pharmacy and pharmaceutical studies. It is possible that these issues were so self-evident to pharmaceutical assistants that they even did not think to mention them. However it could be interpreted that the nurses respected the work of pharmacist more than the pharmacy assistants. It is also possible that the pharmacy assistants had experienced the community pharmacies as a too routine-like working environment. The third possibility is that the nurses had a different conception about learning and what it means to be an expert.

These results are in line with previous research (Savela, 2003), which states that the ideology of continuous development should be fostered during the university studies. Furthermore, the experience and the background of pharmacy assistants could foster their learning. Their former knowledge could be used effectively in studies if its importance would be realised. The learning

should depart from what is known (i.e. from one's own interpretation and one's own life-world) and the knowledge should be related to what is already known (Hounsell, 1997; Prosser and Trigwell, 1999). The pharmacy assistants need special encouragement and motivation to more effectively use their knowledge and skills as a basis for pharmacy studies. Further, the results indicate clearly that the change of pharmacists' work towards expertise and life-long learning may be difficult to foster only through the pharmacies.

Students' conception of pharmacists' work changed during the studies. In the end, the students were motivated for continuous learning and for the development of the pharmaceutical work. The emphasis was also in professionalism, which included the idea of being able to work as an expert in pharmacy and in patient counselling. The results indicate that a positive attitude towards life-long learning was formed during the new curriculum because no differences were found between the students with disparate educational backgrounds. This is important, because the continuous development is necessary in today's working life (Bowden and Marton, 1998). Pharmacy studies should introduce the students to continuous development by enhancing the formulation of intrinsic motivation. If one realises the expert role of pharmacist, one also takes care of one's knowledge and develops oneself more (Savela, 2003). Higher education should thus foster the formulation of a holistic view of pharmacy where the understanding is emphasised.

CONCLUSIONS

The new curriculum succeeded well while the results of its implementation indicate that some further developments are still needed. Attention should be paid to students' motivation and goals. Students' own motivation towards their studies and willingness to learn are more likely to foster deep-level learning and an ideology of continuous development. It is necessary, however, that the learning environment supports this kind of learning. Only by understanding the multiple dimensions of learning and teaching and by seeing the university teaching as a holistic phenomenon is it possible to increase the quality of higher education and, by that way, to produce pharmacy experts who are prepared to take responsibility in their ever-changing working life.

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