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Development of professional knowledge[1]

Introduction

One of the key characteristics of professions is that they are knowledge based occupational groups. Development of professional knowledge therefore concerns the very heart of professionalism. During the latter 30-40 years education in the professions has to an increasingly degree been formalised and institutionalised. Professional education in the "semi professions" has moved from a "vocational" model to an "academic" model and the educational institutions have been upgraded to become part of higher education. The present paper focuses on the qualification processes taking place in college. Educational research indicates that teaching environment, student involvement, student integration and high efforts at academic tasks are some of the most important factors predicting undergraduate students' outcome (Astin, 1991; Pascarella & Terenzini, 1991; Kuh, 2001; Lizzio, Wilson, & Simons, 2002). The aim of this paper is to examine the impacts of contextual and individual factors: Do the types of academic environment within which students are supposed to learn (e.g. workload, teaching quality and social climate) have any significant impacts on students' outcome? How is student success affected by students' motivation, capacity and efforts?

While the latter question may be related to a cognitive perspective on student learning, the former is based on a more sociological approach. Focus on apprenticeship models (e.g. Kvale

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& Nielsen, 1999) and "communities of practise" (Lave & Wenger, 1991; Wenger, 2000) illustrate that social-cultural perspectives on learning has challenged traditional learning theory. The situated perspective tend, however, to ignore that learning are not locked into local settings, but are producing and organising networks across space and time. It should therefore be focused in how students *get connected to knowledge* (Nespor, 1994). Furthermore, including the concept of "*wanting structure*" brings into view underlying unfolding processes and dynamics rather than isolated reasons, as the traditional vocabulary of motives, intentions and actions does (Knorr-Cetina, 1997; 2001). Using the terms "wanting structure" and "connectedness to knowledge" emphasise that learning is a social activity rather than taking place in isolated minds. It is also a way of trying to get around the dichotomies between a pure sociological and a psychological approach. Nevertheless, it should be emphasised that the concepts are borrowed and used in a rather loose sense in the present paper.

There is a huge literature examining the nature of professional knowledge. A basic characteristics of professions is that they combine propositional knowledge like discipline-based theories and concepts and process knowledge based on impressions, interpretations and experience (Eraut, 1994). Aristotle distinguished between "technical knowledge" and "practical knowledge". Ryle (1949) used the terms "knowing that" and "knowing what", while Polanyi (1967) developed the term "tacit knowledge" to describe what we know but cannot explain appropriately with words. Schön (1983; 1987) has focused on the tacit dimension of practical knowledge and particularly emphasised the value of reflection in the development of knowing-in-action into knowledge-in-action. Eraut (1994) argues that deliberate processes lie in the heart of professional work which involve intuitive as well as analytical thinking and discussion.

Educational training institutionalised in universities or university like institutions are often considered highly important in the development of a critical attitude to knowledge and professional practice (e.g. Freidson, 2001). Students learning is however a challenge to educational institutions. Concepts like "expanded" (Engeström, 1994) and "connective learning" (Young, 1998) stresses the importance of contexts of criticism, discovery as well as practical applications to develop these types of knowledge and skills. Beck (1992) uses reflexivity to refer to self-confrontation with the effects of risk society. It may be argued that reflexivity is particularly important in professional work because it is a way of opening up

established ways of thinking not just for improvements but also for fundamental objections. Reflexivity may also be a way of recognising clients and lay audience points of view as constructive contributions to knowledge.

In this paper the term "knowledge" is used to refer to the whole cluster of aspects related to professional competence. As emphasised by Eraut (1994:16) this enables us to address all aspect of knowledge relevant for professional work without getting embroiled in definitional issues. Moreover, it may be questioned the extent to which the different types of knowledge may by distinguished as separate and independent forms. To examine aspects of professional knowledge it is nevertheless differentiated analytically between three aspects of professional knowledge: *specific knowledge*, *practical skills* and *reflexivity,* which are considered to be important in all professional fields.

To examine students wanting structure and the extent that college contribute to their connectedness to knowledge, it is focused on students in nursing, teaching, and economics and business administration. As educational programmes they differ in their classification of knowledge, academic and practise-oriented traditions as well as curriculum characteristics.

The research questions are:

- *Expectations*: Are there differences between educational programs in students' expected educational outcome in terms of specific knowledge, practical skills and reflexivity? If so, how is these differences related to individual and curriculum characteristics?
- *Educational outcome:* What are the impacts of program characteristics on students' experienced educational outcome in terms of specific knowledge, practical skills and reflexivity, when also individual characteristics are considered?
- What are the impacts of students' *expectations* on their *educational outcome*, when also program and individual characteristics are considered?

Data and methodology

The data are drawn form a Database for Studies of Recruitment and Qualifications in the Professions (StudData) in Norway. The present paper is based on students who answered a questionnaire when they started their studies in the autumn 2000 and when they were in their

final term the spring 2003. StudData contains responses to questions covering a wide range of issues. Data from the first wave included several background variables as well as data on their motivation and expectations. Wave 2 includes questions on study efforts, their assessment of various aspects of the educational programmes, satisfaction, gain and expectations for the future. In wave 1 about 2300 students from different programmes and university colleges received the questionnaire and the response rate was 74 per cent. In wave 2 the number of programmes and institutions was extended somewhat, 3700 questionnaires were distributed and the response rate was 75 per cent.

The present paper is based on responses from three professional groups: nursing (N=437), teacher-training (N=559) and economy (business administration, public administration and accountants N=193). Even though the response rate varied somewhat between the educational programmes at the different institutions, the lowest rate was just below 60 per cent, which is considered acceptable. The critical factor is the panel retention due to dropouts and absence in wave 1 or 2. In the data set which is the basis for this paper 559 answered the questionnaire in both waves, while 420 responded only wave 1 and 210 answered only wave 2. The questionnaire was distributed to and completed by students during their lectures. This means students that for various reasons did not attend the current lecture were not included in the survey. The estimations of the response rates are, however based on the total number of students enrolled. Missing response is therefore a complex issue and will be examine more closely in another context.

The independent variables like age, gender and uncertainty in choice of study programme should not need any further explanations. Marks from upper secondary school are average marks achieved in Norwegian, mathematics, English and science. Active study strategy is an index based on eight items assumed to measure academic integration. Time for studies is average hours for study per week including organised instruction as well as individual activities. Teaching quality is an index based on students' assessment of various aspects of the instruction and their teachers, while social climate is an index based on their assessment of the milieu and whether it is a supporting climate among the students. In the regression analyses educational programmes are included as dummy variables using nursing as reference group.

The dependent variables is students' expected educational outcome in terms of specific knowledge, practical skills and reflexivity (ability to critical reflection and assessment of own work) in wave 1 and students assessment of their outcome on these dimensions in wave 2.

To examine the impact of the various independent variables presented above linear regression analyses have been conducted. The analyses which are based on data from both waves only include 416 respondents. Since results in analyses based on low numbers of respondents often become very sensitive to which variables are included, alternative estimations have been conducted to verify the results. There are also some problems conducting significance testing on such a material since impacts of variables which tend to be significant in analyses of larger data set often turns out to be insignificant. In the interpretation of our data it should therefore not be paid too much attention to insignificance of variables. The significance test is nevertheless often an indicator of the importance of the impacts of the variables.

Results

Expected outcome

In general students seem to have about the same level of expectations concerning educational outcome in terms of special knowledge, practical skill and reflexivity, but students in nursing, teacher training and economics differs significantly in their expectations especially in terms of practical skills (Figure 1). Nursing and teacher training students report higher expectation than students in economics in terms of specialised knowledge, practical skill as well as reflexivity. Furthermore, nursing students have higher expectations than teacher training students concerning practical skills.

Linear regression analyses show that most of the background characteristics included in the model have impacts on students' expectations (Table 1). Uncertainty in choice of educational programme is the only background variable which is significantly related to all three types of educational outcome. The relationship is negative, the higher uncertainty the lower expectations. Being male is negatively related to expected outcome in terms of specific knowledge and practical skills, while age and marks from upper secondary school are positively related to specific knowledge and reflexivity. Being born abroad has on the other hand no impact of any type of educational outcome. The differences between educational

programmes in students' expectations shown in Figure 1 are confirmed in the regression analyses.

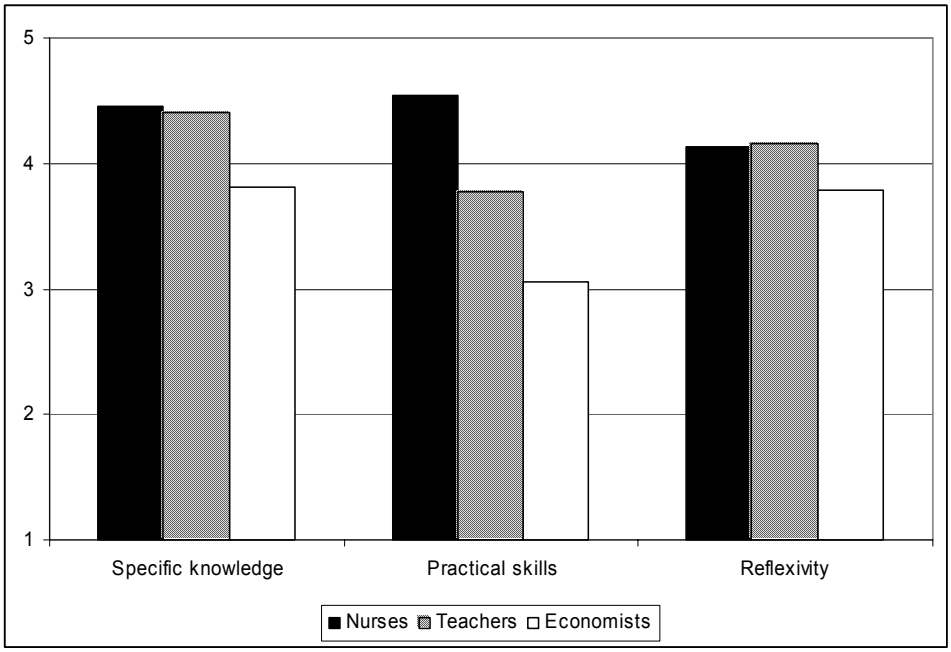


Figure 1 Students expected educational outcome in terms of specific knowledge, practical skills and reflexivity on a scale from 1 (not at all) to 5 (to a very great extent), by educational program.

Table 1 Determinants of students' expected educational outcome in terms of specific knowledge, practical skills and reflexivity. Multiple regression coefficients (B) and standard error (S.E.) in parentheses. (N=760)

	Specific knowledge			Practical skills			Reflexivity		
	B		(S.E.)	B		(S.E.)	B		(S.E.)
Constant	4.046	***	0.230	5.450	***	0.287	3.893	***	0.250
Uncertain choice	-0.046	*	0.022	-0.151	***	0.028	-0.147	***	0.024
Gender	-0.278	***	0.060	-0.353	***	0.075	-0.090		0.065
Age	0.020	***	0.005	-0.005		0.007	0.013	*	0.006
Born abroad	-0.102		0.119	-0.202		0.148	0.058		0.129
Marks	0.086	*	0.038	-0.007		0.048	0.087	*	0.042
Teachers (ref. nurses)	-0.023		0.059	-0.702	***	0.074	0.052		0.064
Economists (ref nurses)	-0.582	***	0.082	-1.259	***	0.103	-0.284	**	0.089
R^2 adj.	0.136			0.295			0.085		

Experienced outcome

Students' assess their experienced educational outcome lower than their expected outcome. That holds for all types of outcome. Nursing and teacher training students report higher expectation than students in economics in terms of specialised knowledge, practical skill as well as reflexivity and nursing students have higher expectations than teacher training students concerning practical skills (Figure 2). The differences between educational programmes are the same as for students expected outcome, even thought the differences between expected outcomes are greater.

Regression analyses indicate that the individual characteristics have limited impacts. Gender, age and being born abroad have significant but weak impacts on reflexivity, practical skills and specific knowledge respectively. Students' marks, which had a positive impact on students expected outcome, have no impact on their experienced outcome. Study activity in terms of study strategy and hours used for studies also has no impacts. Students' evaluation of the quality of teaching is, however positively related to educational outcome in terms of specific knowledge and practical skills. Furthermore, social climate is positively related to practical skills. The differences between educational programmes in Figure 2 are confirmed in the regression analyses, but the latter analyses also show that teacher-training students report less educational outcome than nursing students in terms of specific knowledge.

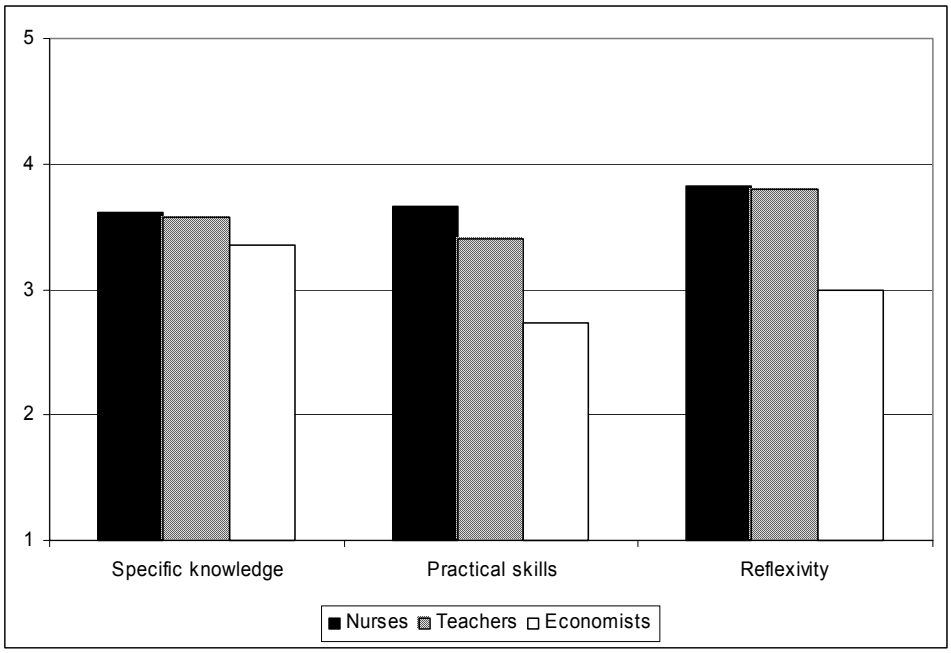


Figure 2 **Students experienced educational outcome in terms of specific knowledge, practical skills and reflexivity on a scale from 1 (not at all) to 5 (to a very great extent), by educational program.**

Table 2 Determinants of students' experienced educational outcome in terms of specific knowledge, practical skills and reflexivity. Multiple regression coefficients (B) and standard error (S.E.) in parentheses. (N=416)

	Specific knowledge			Practical skills			Reflexivity		
B	B		S.E.	B		S.E.	B		S.E.
Constant	2.672	***	0.431	3.975	***	0.447	3.333	***	0.470
Uncertain choice	-0.052		0.037	-0.071		0.038	-0.046		0.040
Gender	0.050		0.100	-0.118		0.104	-0.221	*	0.109
Age	-0.001		0.009	-0.021	*	0.010	0.015		0.010
Born abroad	-0.501	*	0.222	-0.291		0.230	-0.177		0.242
Marks	0.058		0.063	-0.069		0.066	-0.080		0.069
Active study strategy	-0.042		0.050	-0.017		0.051	0.043		0.054
Time for studies	0.005		0.004	0.001		0.004	0.005		0.004
Teaching quality	0.177	***	0.042	0.150	***	0.043	0.044		0.046
Social climate	0.049		0.031	0.073	*	0.032	0.056		0.034
Teachers (ref nurses)	-0.262	*	0.102	-0.492	***	0.106	-0.022		0.111
Economists (ref nurses)	-0.649	***	0.143	-1.128	***	0.148	-0.799	*	0.156
R^2 adj.	0.076			0.179			0.123		

Expectations versus experiences

It is a general trend that students' report lower experienced than expected educational outcome. This holds for all the programmes and types of outcome. The discrepancy between expectation and experience varies however between the programmes. Nursing and teacher training students report a lower level of fulfilment of expectations for specific knowledge than economists, and nurses report greater discrepancy between expected and attained practical skills than teacher training and economy students. These differences between the programmes are due to higher expectations among the respective groups and not lower experienced outcome (Figure 1 and 2). The lower fulfilment of economy students' expectations for reflexivity compared to students in the other programmes has, however, first of all to do with lower experienced outcome and not high expectations.

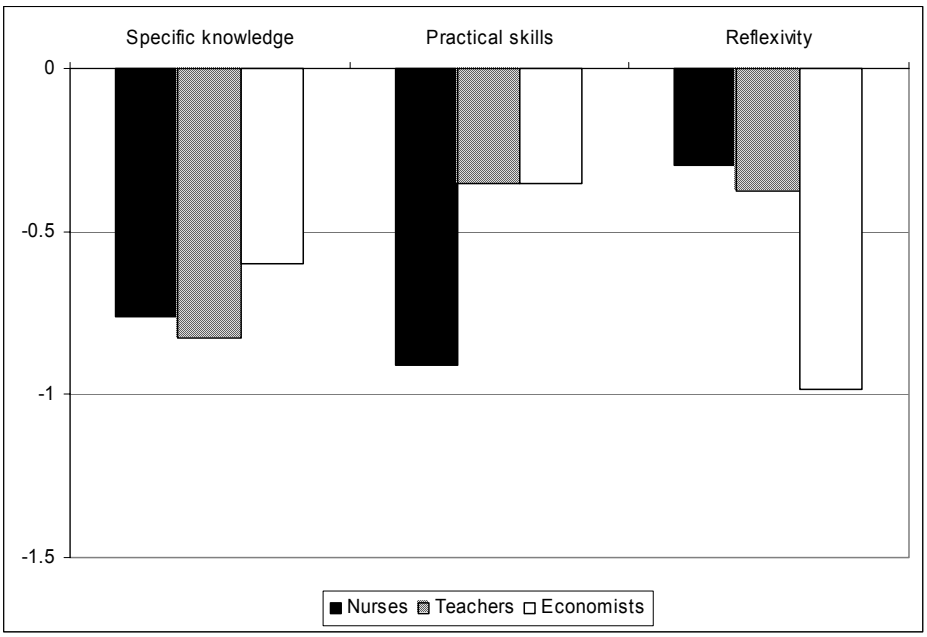


Figure 3 Discrepancy between students' expected and experienced educational outcome in terms of specific knowledge, practical skills and reflexivity on a scale from 1 (not at all) to 5 (to a very great extent), by educational program.

Table 3 shows that expected outcome has a significant impact on experienced outcome in terms of practical skills and reflexivity. It should be emphasised that including "expected outcome" improve the model somewhat and do not reduce the impacts of "teaching quality" and the variables measuring differences between educational programmes. However, "gender" and "age" which have some impacts in the former model (Table 2) have no significant impact in the latter (Table 3). Since the reason why expected outcome do not have any significant impact on experienced specific knowledge could be the relative high number of independent variables related to number of respondents an alternative estimation were conducted; "uncertain choice" was excluded from the analysis. Expected outcome then turned out to have a significant but weak impact.

The models seem most appropriate explaining practical skills and least appropriate explaining specific knowledge. Differences between the programmes have important impacts in all the models. This is the reason why the models have stronger explanatory power in the analyses of outcome in terms of practical skills than in terms of the other aspects of knowledge (see Figure 1, 2 and 3).

Table 3 Determinants of students' experienced educational outcome in terms of specific knowledge, practical skills and reflexivity. Multiple regression coefficients (B) and standard error (S.E.) in parentheses. (N=416)

	Specific knowledge			Practical skills			Reflexivity		
	B		S.E.	B		S.E.	B		S.E.
Constant	2.268	***	0.488	3.031	***	0.518	2.721	***	0.507
Uncertain choice	-0.050		0.037	-0.042		0.039	-0.030		0.040
Gender	0.068		0.101	-0.058		0.103	-0.211		0.108
Age	0.000		0.009	-0.018		0.010	0.014		0.010
Born abroad	-0.467	*	0.222	-0.223		0.228	-0.133		0.240
Marks	0.034		0.064	-0.071		0.065	-0.096		0.070
Study strategy	-0.052		0.050	-0.009		0.051	0.035		0.054
Time for studies	0.005		0.004	0.000		0.004	0.005		0.004
Teaching quality	0.167	***	0.042	0.130	**	0.043	0.033		0.045
Social climate	0.054		0.031	0.079	*	0.032	0.052		0.033
Expected outcome	0.115	(*)	0.060	0.171	***	0.049	0.180	**	0.059
Teachers (ref nurses)	-0.251	*	0.102	-0.352	**	0.112	-0.010		0.111
Economists (ref nurses)	-0.555	***	0.146	-0.861	***	0.163	-0.790	***	0.154
R^2 adj.	0.079			0.201			0.149		

Discussion

The aim of professional education is to make a distinctive contribution to students' knowledge base and their socialisation into the occupation. Development of professional knowledge is, however, a continuous process and important elements of the knowledge may first be really developed during occupational practise. The fact that professional graduates lack important knowledge is therefore not necessarily a weakness of the respective educational programmes. An important question is what types of knowledge are best learned in higher education, what is best learned in professional practice and what is best learned through an integrated course involving both contexts (Eraut, 1994:100-122). These questions could of cause only be answered examining the different types of professional knowledge and competence in detail. In general, it could however, be argued that the main objective of higher education is to develop students' connectedness to the different aspects of professional knowledge. This do not only imply that students have developed a basic knowledge base and learned to learn, it also includes a wanting structure. As emphasised by Knorr Cetina (2001) these dynamics may be understood as a forward-pointing sequence of steps. The interest of knowing appears never to be fulfilled by final knowledge.

Individual characteristics

Focusing on students' individual characteristics it is interesting to note that more of these variables have significant impact on expectations but less so on students experienced outcome. It seems reasonable that students which are certain that they have chosen right programme and students with good marks from upper secondary school has higher expectations than students that are less certain and less qualified. The positive impact of age may be related to a somewhat similar mechanism; for older students attending higher education may more often imply a downturn of their financial condition than for younger students. It is therefore reasonable to assume that older students' choice are based on relatively high expectation compared to younger students'. The reason why women have higher expectations than their male counterparts may be related to the same trend as underlie the general feminisation of higher education. Women seem in general to have greater confidence in the advantages of entering higher education. It may, however, also be a general trend that women are more enthusiastic when they are answering these types of questions.

The individual characteristic variables examined above turn out to a less extent to have significant impacts on students' experienced outcome. It should be emphasised that "students' experienced outcome" is based on student own evaluation and are not related to the outcome of other student or more objective measures on educational success. It is argued that students' report on gain is feasible and in many respect the only source of useful data (Kuh, Pace, & Vesper, 1997). It seems reasonable that uncertain choice first of all has an impact on students' expectations and not the experienced outcome among the students, which have chosen to fulfil the programme, they have enrolled. Research literature indicates that one of the best indicators on student success in education is their prior marks (Good & Brophy, 1986; Berg, 1997; Grøgaard, 1999). Studies based on student self reported gain report, however, only a weak (Lizzio et al., 2002) or no impact of prior achievement on students outcome (Toutkoushian & Smart, 2001). Since our dependent variables are measuring a kind of "value add" this may be the reason why prior marks seem to have no impacts. Considering the quality of their future professional work, it could be argued that it is important that the least qualified have improved their qualifications as much as the more qualified. It may, however, also indicate that there is an unutilised potential for further development connectedness to among the most qualified.

Also among the other individual characteristic variables it seems that variables that have a significant impact on students expectations do not have an impact on students experienced outcome, while more of the variables that do not have an impact on students' expectations have an impact on their experienced outcome. Age has as mentioned above a positive impact on expected outcome in terms of specific knowledge and reflexivity, but only on experienced and not on expected practical skills. Since older students are more likely than younger students to have relevant occupational practise before enrolment, this may be the reason why age has no positive impact on expectations for practical skills and a negative impact on their experienced outcome of this type of knowledge. Furthermore, being male has a negative impact on expectations for specific knowledge and practical skills, but on experienced and not expected outcome in terms of reflexivity. Also in prior studies women report significantly higher gains than men (Toutkoushian & Smart, 2001). Being born abroad has no impacts on expectations, but a significant negative impact on outcome in terms of specific knowledge. The latter is consistent with the findings in the study conducted by Toutkoushian and Smart (2001).

Research literature indicates that students' efforts, approaches and how they spend their time have a positive impact on students' educational outcome (e.g. Pascarella & Terenzini, 1991; Prosser & Trigwell, 1999; Koljatic & Kuh, 2001). This is not confirmed in our analyses. One reason may be that there is a reciprocal link between students' approach to learning and their perceived workload The reason why hours used for studies has no impact may also be that students' in professional program adjust their efforts according to what is considered sufficient. It should, therefore, not be interpreted as an indication that students not improve their educational outcome if they use more time. Estimations on the same data material as used in the present paper were educational outcome is based on an index show that student study strategy has a significant impact (Aamodt, 2004). The insignificance of the latter variable should therefore not be emphasised.

The relationship between expectations and experienced outcome is confirmed in the last regression analyses, which show that gender and age loose their impact on experienced outcome when experience outcome is included in the model. Expected outcome has a significant positive impact on students experienced outcome. Students' expectations in the very beginning of their professional study should not be regarded as a wanting structure, since these expectations only to a limited extent are based on experiences related to seeking and

developing knowledge in professional work. Nevertheless, the impacts of expectations on students experienced outcome confirm the importance of the forward pointing dynamics that characterise connectedness to knowledge.

Curriculum characteristics

Students' assessment of teaching quality is positively related to their educational outcome in terms of specific knowledge and practical skills, while social climate has a positive impact on practical skills. The impact of social climate and integration is central in prior studies especially of student drop out (Tinto, 1998). Also the impact of students' perception of teaching environment is confirmed in the literature (Lizzio et al., 2002). Review of validity and reliability of students' evaluation of teaching indicate that students are apparently able to discriminate their instructors' strengths and weaknesses, at least when ratings are aggregated over many students (Marsh & Bailey, 1993). An important criterion for whether teaching is good or bad is student learning. Our results indicate that study quality rather than student efforts have the most important impacts on student learning. One reason may be that professional programmes are much more teaching intensive and less based on students own study activity than traditionally academic programmes (Aamodt, 2003). However, interactions between these variables as well as the relatively low number of respondents indicate that there is not a basis for such clear conclusions.

The variables which have the most important impacts are the educational programmes as demonstrated by the Figures. The reason why students in economy expect and experience a lower level of educational outcome in terms of specific knowledge and that nursing student also experience higher level of this type of outcome than teacher training students is probably related to the extent to which curriculum are characterised as general or professional education. Even though all these programmes are multi disciplinary and directed towards specific occupational fields, there are significant differences between these professional fields in the extent to which their professional knowledge is relevant in other occupational settings.

A general characteristic of professionalism is application of knowledge. Nevertheless, it is almost self-evident that some professions are considered more practical than others. This is also reflected in the curricula. While practice composes 50 per cent of the study in nursing and about 20 per cent in teacher training, it is no organised practise in economics. Practical skills may of cause be learned in different types on learning contexts. Even so, differences

between the professional programmes in students' expected as well as experienced practical skills seem to be highly related to the proportion of practise in curriculum.

The reason why there are differences between the educational programmes in expectations and experienced outcome in terms of reflexivity may be less obvious since it may be argued that this should be important in all professional fields. Studies indicate that a critical perspective is more likely to be endorsed by arts and humanities disciplines (Lattuca & Stark, 1994) and corresponds to characteristics of hard and soft field of learning (Becher & Trowler, 2001). It may be difficult to distinguish clearly between the knowledge base in nursing and economics according to a hard – soft dimension. Nevertheless, even though exact medical knowledge is included in nursing, it could be argued that the use of mathematics and logical statements are more common in the latter than the former program. Furthermore, learning how to handle discretion in a professional way is probably more central in nursing than in economic education. Discretion is a type of qualifications that presupposes reflexivity.

It is a general trend that students report higher expected than experienced educational outcome. This should, as emphasised above, not be interpreted as an indicator of weak study quality. First, our analyses show that expectations have a positive impact on outcome. Studies indicate that student motivation is positively related to performance, especially when it corresponds with discipline specific goal structures (Breen & Lindsay, 2002). Second, development of professional knowledge is not restricted to higher education. In this perspective it could be argued that the unfulfilled expectation of educational outcome is not necessarily a signal that these types of knowledge should be given more attention in the programmes. Third, unfulfilled expectations could be interpreted as an indication that student have become aware the need for continually further development of professional knowledge. In terms of students' connectedness to knowledge and wanting structure, this type of unfulfilled expectations could be considered as a potential for further development rather than an indication of student's lack of professional knowledge.

Unfulfilled expectations could, however, also be an indication on specific weaknesses in the educational programmes. Degree of unfulfilled expectations should, therefore, be related to the level of expectations as well as the possibility to develop these types of knowledge in professional work and continuing education. The high level of unfulfilled expectations for practical skills among nursing students could be interpreted as an implication the high

proportion of practise in curriculum. Since practical skills to a great extent are developed in professional work, these unfulfilled expectations are hardly critical. The high degree of unfulfilled expectations for reflexivity combined with relatively low expectations among economists may, however, indicate that this type of knowledge should be developed to a greater extent in this programme. Reflexivity also has a moral dimension. The scandals in finance companies during the recent years could indicate that economy students' should develop a stronger wanting structure related to such aspects of professional knowledge.

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