

ISSN nr. 1501-6064		Høgskolen i Akershus (Akershus University College)
ISBN nr. 978-82-488-0031-6	16/2009	16/2009 Utdanning og arbeidsliv (Education and Work)
Høgskolen i Akershus (Akershus University College)		Formal and Informal Learning: Shall the Twain Ever Meet in Adult Education?
		Içara da Silva Holmesland & Judy Deanne Lundin (Eds.)

What are the experiences with non-formal/informal learning students in higher education? How do students with a non-formal/informal background cope with lessons of theory, with practical lessons and in cooperation with students with a formal background? What is their motivation like? Do they behave differently from other student? How do they succeed?

Researchers from three profession-oriented studies at Akershus University College have studied the consequences of the admittance of students with informal/non-formal backgrounds in their programmes. Through several essays the researches present their findings of informal/non-formal learning students as being more motivated, having a more effective way of spending their study time and lower drop-out rate, and being as well as successful as their fellow students with a formal competence.

But not without struggle. Students with a non-formal/informal competence met great literacy challenges in several subjects, and challenges were equally as great to complete the theoretical syllabus as well as to use and understand foreign words and phrase or to write project reports and examinations papers.

Students with a non-formal/informal competence were admitted to higher education through The Competence Reform, launched by The Norwegian Government in 2000. The question has been whether this reform has led to a democratisation of knowledge in higher education or not. The answer given in this book is – yes it has.

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16/2009

Høgskolen i Akershus (Akershus University College)
Forskningsserie (Research Series)

ISSN nr. 1501-6064

ISBN nr. 978-82-488-0031-6

Opplag trykkes etter behov, aldri utsolgt

© Høgskolen i Akershus

Høgskolen i Akershus (HiAk) har fra 1999 etablert
3 skriftserier

Forskningsserie ISSN nr. 1501-6064

Rapporter og utredninger ISSN nr. 1501-6072

Læremidler for profesjonsutdanning ISSN nr. 1501- 6080

Høgskolen i Akershus, Skriftserien

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Adresse hjemmeside: <http://www.hiak.no/skriftserien>

For elektronisk bestilling klikk Bestille bøker

For manuell bestilling fax (47) 64 84 90 07.

Design: Bruno Oldani

Produksjonstilrettelagt: Mette Lund Damsleth

Trykket hos Allkopi

Trykket på Multilaser 80 g hvit

Foreword

As a consequence of the Competence Reform in higher education in Norway (NOU, 1999:17), the educational programmes at Akershus University College started accepting students for admission on the basis of non-formal and informal learning. These students were enrolled in the classes attended by students with formal learning, i.e., who had completed upper secondary school.

Having students mixed in groups with different types of background, i.e., with and without upper secondary education raised the question of how and to what degree the programmes would meet the needs of students accepted on these two different basic principles as well as how prepared they would be to face the demands of the job market.

Three follow up research studies were carried out during a period of three years in the programmes of Facility and Service Management, Institutional Catering Management, and Nursing Education. As a consequence of their results, another research was done later on with a focus on the performance of non-informal/informal learning students in Accounting and Managerial Economics

The educational scenario in Norway and in Europe has been submitted to several reforms and is undergoing various changes, especially in the area of adult education and lifelong learning. The intention behind these studies has been to contribute for a better understanding about the importance of life experiences and the working life for adult learning in the higher education context. All articles focus on learning in educational programmes aimed at professions. In the first article, Içara da Silva Holmesland discusses adult education and the accreditation of informal and non-formal learning in higher education. In the second article, Judy Deanne Lundin and Hans Risan discuss the implementation of the Competence Reform in the faculty of technical and vocational teacher education at Akershus University College. Judy Deanne Lundin presents and discusses the results of her research in Facility and Service Management in the third article. Next, Hans Risan discusses the implementation of the Competence Reform in the Institutional Catering Management Programme. In the fifth article, Kjersti Sortland discusses the Competence Reform in Nursing Education. In the sixth article, “How students with formal and non-formal competence manage Accounting and Managerial

Economics” Knut Boge presents and discusses results of his research with non-formal and formal learning students enrolled in the programmes of Facility and Service Management and Institutional Catering Management. Finally, in the last article, Içara da Silva Holmesland and Judy Deanne Lundin discuss questions related to democratisation of knowledge in the article “Richness in diversity - the democratising of knowledge in higher education”.

Else Askerøi, former editor of Akershus University College’s publication series, was the main driving force that made this book turn into reality. The authors are very grateful for her support and her advices throughout the preparation of this publication. We wish also to thank the librarian, Anne Nordli Ekanger, for her careful review of all references.

We feel very indebted to the students who participated in answering questionnaires, giving us response in the in-depth interviews and all-in-all sharing important experiences and information with us. Without their genuine involvement and interest in supplying the researchers with invaluable information, this book would not have existed. We extend our best wishes for their continuing learning and career building. With their participation, we hope that our findings can make a contribution to the area of lifelong learning.

Lillestrøm, September 2009

Içara da Silva Holmesland and Judy Deanne Lundin

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Abbreviations

AUC =	Akershus University College
BFCM =	Bachelor in Food and Catering Management (AUC's three years bachelor programme introduced 2003)
BFCM =	Bachelor in Food and Catering Management (Institutional Catering Management, from 2003 three years bachelor educational programme)
BFSM =	Bachelor in Facility and Service Management (AUC's three years bachelor programme introduced 2003)
BPN =	Bachelor in Public Nutrition (AUC's three years bachelor programme)
FSM =	Facility and Service Management (AUC's two years candidate programme)
FSM =	Facility and Service Management (two years candidate programme)
ICM =	Institutional Catering Management (AUC's two years candidate programme)
NRK =	Norsk Rikskringkasting (Norwegian Broadcasting)
ØUC =	Østfold University College
SPSS =	Statistical Package for Social Sciences

Adult education and the accreditation of informal and non-formal learning in higher education

Içara da Silva Holmesland and Judy Deanne Lundin

Introduction

The theme of this book is formal and informal learning¹ in the realm of adult education, which is a form of education practised worldwide but with great variation in its purposes, scope, philosophy, and structure. Due to the growing importance of how adult education is responding to the challenges of global issues, the aim of the authors, in a strict sense, is to examine how adult education is implemented in Norway under the specific perspective of the Competence Reform, according to which non-formal/informal learning is just as legitimate a form of entrance to higher education as the formal learning that takes place in the domain of institutional settings. Throughout the articles, the authors present and discuss the relevance of practise and work experience for adult education and its contribution to learning that takes place in the formal setting of higher education.

Another aim of the authors is to examine and discuss questions related to adult education in a broad sense. We live presently in the so-called knowledge society, which means that knowledge is increasingly being regarded as a right of every individual and no longer a privilege. The many efforts that are made today to offer opportunities for lifelong learning to adults are an expression of such an ideal. The concern for adult education has existed for a long time, already expressed in 1926 by Lindeman (Knowles, Holton, & Swanson, 1998), who was influenced by the ideas of John Dewey. The foundations for a theory about adult learning were laid by Lindeman who identified various key assumptions about adult learners, being the main one that *education is life* (Lindeman, 1961). As a defender of the idea that “*education is life* – not a mere preparation for an unknown kind of future living” (Ibid. pp. 4), he laid the foundations for adult education in his belief that education has no ending. Therefore, he emphasised the importance of a curriculum built upon the student's needs and interests and of work experiences.

¹ *Formal learning* means learning acquired on the upper secondary school level and which qualifies for entering higher education. *Non-formal/informal learning* means learning that occurs within enterprises, voluntary organisations, trade unions and others, while informal learning, as often defined, is a non-intentional form of learning that takes place in one's everyday life. (VOX, 2002a; VOX, 2002b). However, throughout this book, the expressions *formal competence* and *non formal/informal competence* have been used interchangeably with *formal learning* and *non-formal/informal learning*, respectively.

Lindeman's ideas were brought back in the 1970s when adult learning theory was re-introduced by Malcolm Knowles, challenging established concepts about learning and accepting the idea that adults learn differently from children (Knowles, 1990; Knowles, et al., 1998, Cross1981). A summary of Lindeman's key assumptions about adult learners include the following assertions (Knowles, et al., 1998):

- Adults are motivated to learn as they experience needs and interests that learning will satisfy
- Adults' orientation to learning is life-centred
- Experience is the richest source for adults' learning
- Adults have a deep need to be self-directing
- Individual differences among people increase with age

In the past few decades there was a revival of the interest for adult learning and a consensus among researchers about the need to direct the focus of studies toward adult education. Such concern has been accentuated recently, especially in connection with the rapid transformations taking place in society and in the forms of knowledge acquisition. Providing learning opportunities to adults and knowing more about how adults learn has thus become an important area for research. The so-called *andragogical theory of adult learning*² is one of the focuses in the publication of Knowles, et al. (1998), in which the authors propose six assumptions that are pertinent to learning in adulthood and, particularly, relevant to professional learning and human resource development:

- The need to know
- The learner's self-concept
- The role of experience
- Readiness to learn
- Orientation to learning
- Motivation

All these assumptions stand out as driving forces that have stimulated learning among the adults that participated in the studies described in this book.

In need of a wider learning concept?

Learning does not necessarily happen in a formal setting. As a matter of fact, learning happens everywhere. One can learn at work, at home, during leisure time, in activities carried out in voluntary organisations, and in many other places. This is not new, but what has changed is the accessibility to many different sources of knowledge acquisition and the recognition that it happens not only in settings created specifically for transmis-

² The term *andragogy* was first coined in 1833 by Alexander Kapp, a German school teacher. For a full account of this term's development, see Knowles et al. (1998, pp. 58-61).

sion of knowledge, such as schools or universities, but everywhere. The changes in the forms of learning today bring forward the fact that learning occurring in non-formal settings can be just as pertinent, relevant and good as learning in the formal environments (Bergan, 2006).

It should be emphasised that it is not being claimed here that schools, universities or other types of educational institutions are no longer necessary. On the contrary, they are important meeting places for the organisation and systematisation of learning for children, youngsters and adults. In addition, these institutions are specialised in the best ways to deliver, spread and advance knowledge in social contexts. They are indeed the best indicators of the democratic level attained by any nation. However, they can no longer be regarded as the only places for learning. One can perhaps state that formal learning is, and ought to be intertwined with the learning that takes place everywhere in society. The workplace, for instance, is increasingly being recognised today as a very important arena for knowledge acquisition among the policies of the Bologna Process. In the section on lifelong learning of the Berlin communiqué, ministers have emphasised the important contribution of higher education to make lifelong learning a reality. As part of this process higher education institutions have been urged to enhance the possibilities for lifelong learning at higher education level, including the recognition of prior learning, which often occurs at the workplace.

The combination, or alternation, of work with education, carried out in various ways, is becoming quite common and even regarded as a very effective and relevant form of learning in the post-modern society. To make such assertions true, one has to find evidences about the validity of non-formal/informal learning, in other words, that the experiential learning of individuals is among the building blocks for one's education and professional career. This is the main aim of this book. The common purpose of the authors is to search for answers to their research questions by examining the literature on lifelong learning and relating it to the empirical findings in their projects.

Adult Education in Norway and the European context

The concern for lifelong learning and, consequently, adult education, as it is being implemented in Norway dates back to February 1996. At that time the government asked for a White Paper on a Lifelong Learning reform with the aim to lay the foundation for a national plan of further education for adults (St. meld. Nr. 42 1998). The concerns expressed in that plan reinforced the general beliefs held in Norway about equity in education (Opheim, 2004). This was done by extending the ideal of equality of educational opportunities further beyond, in order to include adults who lacked formal learning but had relevant work experience as a basis for continuing education at the tertiary level. Some reasons often

mentioned for such need are related to the rapid changes happening in society, often associated with technological development, the greater international competition and an increasing globalisation of economies. All these factors are claimed to demand higher competence, especially when speaking about the work force.

Demands and changes related to globalisation of society are often pointed out as having a great impact on all types of education and forms of deliverance. Globalisation of society and the rapid rate of technological development have also affected the Norwegian educational system, which has had to adjust its educational policies and organisation of the educational system to the societal demands for higher levels of competence (Tarrou, 2005; Tjeldvoll, 1998; Tjeldvoll & Holmesland, 1997).

Investigating adult learning in Norwegian higher education

Several projects have been carried out at Akershus University College since 2000. The first ones were implemented during a period of three years in three educational programmes – Facility and Service Management, Institutional Catering Management and Nursing Education. Although different in their specific purposes, the projects had as a common aim to investigate how each programme met the needs of students with both non-formal/informal learning and with formal learning. In all the programmes, the students attended classes together. The most recent one was carried out in 2008. It focused on the students' mathematical abilities in relation to their performance in a module of Accounting and Managerial Economics.

Prior to presenting the projects' results, issues related to knowledge acquired at the workplace and to validation of non-formal and/or informal learning are introduced and discussed. These themes have been in the core of debates about lifelong learning and its relation to qualifications frameworks and democratisation of knowledge, in Europe and elsewhere. Thus, they are very relevant to better understand the rationale behind the research projects.

Education and workplace learning

In the Western educational context here described, the borders between schools and work are becoming gradually more diffuse. Globalisation and the development of information technology have facilitated the access to knowledge by increasing the number and variety of spaces, often outside educational institutions, within which individuals can learn. The opening of new learning arenas has provoked discussions about modes of learning

and has been challenging the traditional learning carried out in formal educational systems. Non-formal and informal learning modes also set the focus on the importance of practise and experiential learning. There is currently a great diversity of spaces for learning, which might include the workplace as well as other areas where individuals can develop their interests, either privately or as members of learning communities. This thought can be reinforced by a recent contribution made by Tora Aasland, minister of research and higher education, to the debate column of a Norwegian newspaper, in which she emphasizes the importance of integrating education and work by stating that this is today a necessary development for succeeding in the establishment of the knowledge society (Aasland, 2008). As a matter of fact, the debate about workplace learning (Askerøi, 2005; Tarrou, 2005; Tarrou, 1997) has been going on for some years. Tarrou (2005, 1997) emphasises in her studies that schools and workplaces are in reality complementary arenas. Several other studies (Stevenson, 2002; Searle, 2002) have investigated workplace learning. The findings of these studies refer to the nature of workplace knowledge, knowledge use and task performance in operational settings. According to Stevenson (2002, p. 1) the findings support the view that teaching for workplace competency must consider the complex interactions among generic and site-specific knowledge attainments. Furthermore, Stevenson argues that ideas of transfer of generic knowledge from prior learning experience are too simplistic. Searle (2002), who has studied communication at the workplace, states that her study supports the claim that literacies at work are highly contextualised and go beyond generic skills. These studies indicate that workplace learning is an important area for research on teaching and learning.

Accreditation and validation of non-formal/informal learning

Theoretical discussions about the importance of situated learning (Lave & Wenger, 1991) and of communities engaged in learning, the so-called communities of practises (Wenger, 1998) are supportive of other forms of learning, which consist of activities outside the formal learning settings. Thus, it has become more accepted that the space of formal learning is only one among several other spaces for learning. However, the learning that happens outside the formal learning system is often very wide, making it difficult to define and validate the qualifications earned by the individuals.

Until not too long ago, learning that occurs outside educational institutions did not lead to formalised certificates, however today it is regarded as a resource to be more systematically valued and used. The interest to study and carry out research about learning outside formal education is

reflected in recent legislation, projects and debates taking place in Scandinavia and other European countries since the beginning of 2000. Among such, one can cite the Competence Reform in Norway (KUF, 1998), the DeSeCo project³ (OECD, 2003; Rychen & Salganik, 2003), the TRANSFINE project⁴ and initiatives to establish virtual communities to discuss the issues of non-formal and informal learning, as the ones carried out by CEDEFOP⁵ in 2003. These initiatives have a lot in common with efforts that started in the 1990s to establish Qualifications Frameworks⁶, which are thoroughly discussed in a recent publication of the European Journal of Education (Young & Gordon, 2007). By examining the publications of these projects, one finds several commonalities with the purposes of the qualifications framework. Among other motives for developing qualifications frameworks, Young & Gordon (2007, pp. 439) point out two reasons that match the ones focused by the projects discussed in the following articles. These reasons indicate a need for:

... providing a framework within which an individual's formal and informal learning can be recognised and accredited (for the purposes of study, training, employment, mobility, etc.) and ... providing a basis for the exchange, credit transfer and recognition of qualifications between different countries.

The recognition of non-formal and informal learning was actually born in the domain of vocational education and training and it has spread to other areas as part of debates around lifelong learning. It is also partially connected to the development of the European Credit Transfer System (ECTS), meant to facilitate the mobility of students between institutions of higher education and to the establishment of qualification frameworks aimed at validation of knowledge gained by means of non formal/informal learning. The acceptance of other forms of learning is also linked to attempts toward the democratisation of learning. However, most of all, such recognition implies the acceptance that the spaces within which individuals acquire practical experiences have valid educational dimensions, which deserve to be accredited.

³ The OECD Program *Definition and Selection of Competencies: Theoretical and Conceptual Foundations (DeSeCo)* were an interdisciplinary, international scientific project initiated by OECD and carried out in close collaboration with ongoing OECD assessment programs. <http://www.portal-stat.admin.ch/deseco/index.htm>

⁴ TRANSfer between Formal, Informal and Non-formal education (a project carried out in response to the Joint Action Call for the European Commission). <http://www.transfine.net/>

⁵ CEDEFOP is the French acronym of the organisation's official title, European Centre for the Development of Vocational Training (Centre Européen pour le Développement de la Formation Professionnelle). <http://www.cedefop.europa.eu/index.asp?section=1>

⁶ For a discussion on how to define, identify and develop key qualifications see Kämäräinen (2002)

The accreditation of prior experiential learning is a relatively recent concern of European countries. Such accreditation is being implemented with greater or lesser intensity depending on each country's social, economical and educational needs (Kirsch, 2003). This process can become complicated therefore it is important to keep in mind that the identification, assessment and recognition of non-formal learning have to be based on simple and inexpensive methodologies. It is also necessary to have a clear notion of how institutional and political responsibilities are to be shared. One of the important aspects is that the methodologies must deliver what they promise, being the quality of 'measurement' very crucial (Björnavåld, 2001). Several forms of accreditation and validation of non-formal and informal learning being used in European countries are described next.

According to Björnavåld (2001, pp. 24-32), the national vocational qualification system (NVQ) in the United Kingdom is a clear example of a competence-based, performance-related, output-oriented system of vocational education and training. This is also an alternative to traditional school-based model of education and training. Assessment methodologies for accreditation of prior learning date back to 1991 and have aimed mainly at a rational assessment of what individuals have learnt. Young provides a thorough discussion about conceptual issues related to qualifications frameworks (Young, 2007). Interest for establishing these frameworks have existed for a long time, at least since the early 1990s and Young (ibid, pp. 445) calls the attention for "a growing and increasingly international interest in the idea of national (and in some cases international) qualifications frameworks".

One of the purposes of accrediting possessed knowledge and skills is to avoid repetition of what candidates already know and thus reduce training time. The procedure consists of three steps:

- Obtaining information from advisers about the requirements for accreditation of prior learning
- Organisation of a portfolio⁷ related to requirements of the desired qualification
- Assessment of the candidate's knowledge

⁷ The portfolio is considered a very important document because it includes present and past employers' statements about which tasks the candidate has performed and his/her responsibilities, in other words the candidate's competencies. This appears to be a critical point of any accreditation process. If the employers and/or employees are not aware about the importance of detailed statements regarding tasks and responsibilities performed by the employees, the latter may lose a great opportunity to gather important information that can be used to their benefit in the future.

In France, accreditation of prior learning has existed since 1985, although known only by a limited audience as accreditation of work experience. However, as indicated by Kirsch some years ago (Kirsch, 2003), the practises associated with such accreditation were likely to undergo considerable change under France's law on social modernisation. A review of the new practises for accreditation of prior learning summarises the recent measures for accrediting prior experiential learning (*validation des acquis de l'expérience*, VAE) voted in January 2003 (ibid, 2003). The conditions of access and the procedures for accrediting prior learning included the following modifications:

- Prior work experiences are extended and include experience acquired in the context of an unwaged or volunteer activity
- The minimum length of the experience required for access to accreditation of prior learning is reduced from 5 to 3 years
- The field of certifications accessible through accreditation of prior learning has been enlarged to cover a greater number of vocational diplomas and titles as well as certain vocational qualification certificates (*certificats de qualification professionnelle*, CQP)
- Candidates had the possibility to obtain an entire title or diploma through accreditation of prior learning
- The juries reach their decisions on the basis of an application package prepared by the candidate, possibly followed by an interview (required for higher-education titles) or, in certain cases, placement in a real or simulated work situation

When the jury does not grant the entire targeted diploma or title, it decides on the nature of the knowledge and aptitudes, which should be subject to an additional test. This form of accrediting knowledge in France differs from that of Norway in the sense that in the former it might totally replace formal learning in higher education whereas in the latter it opens the possibility to enter higher education without formal learning at the upper secondary level. What is inferred as a basic difference between these two countries is that, in France, accreditation of non-formal/informal learning is more associated with granting of credentials, while in Norway it is viewed as part of a lifelong learning trajectory.

The procedures that have been followed in France appear quite specific for the French system. However, in a publication about the French vocational education and training system (Bouder & Kirsch, 2007), the authors state that contrary to many people's beliefs, in reality

... the French system has been operating on the basis of principles and models that closely resemble those now defended at the European level.

This statement is supported by several reports, which indicate that there has been a considerable movement in Europe toward the implementation of national and European qualifications frameworks, which encourage the accreditation of individual's learning and offer a basis for transferring credits and attaining supranational recognition (ibid, pp. 504).

In Norway, as in Great Britain and in France⁸, learning is being recognised as a lifelong process. The workplace, thus, has become one of the different arenas to be considered for knowledge acquisition and recognition. The focus of attention regarding validation of prior learning includes professional experience as well as knowledge acquired during training, be it paid or voluntary work. Equally important is learning that takes place through active participation in organisations, in community life and at home. Such wide acceptance of learning spaces has extended the field and the themes focused on research on learning. It has created new spaces for conducting investigations on the role of teachers and on teaching methods (Holmesland et al., 2003). This seems also to be a concern in France, where researchers are increasingly more engaged in investigations about the creation and dissemination of knowledge in different arenas⁹.

An interesting aspect of the validation of non-formal and informal learning is the value given to learning based on experiences and through one's participation in communities of practise. Björnavåld (2001) emphasises that learning is contextual in its character and that knowledge as well as competences are very much the result of participation in 'communities of practise'. This means that learning is not a passive reception of pieces of knowledge, but rather has to do with both the participation of individuals in groups and their capability to communicate (Polanyi, 1962).

Research on situated learning (Lave & Wenger, 1991) and studies by Wenger (1998) about communities of practise add theoretical explanations that give strong support to non-formal and informal learning as legitimate forms of learning. Therefore, the initiatives to accredit prior learning in its connection to specific fields of knowledge open new areas for investigations. One of them has to do with criteria for accreditation. Who are the people entitled to judge this type of knowledge and what is their background? What types of documents are necessary? These ques-

⁸ Although it is referred here to Great Britain and France, other countries are also validating prior learning. Those interested in fuller account of these experiences should read CEDEFOP's publication «Making Learning Visible: Identification, Assessment and Recognition of Non-formal Learning in Europe».

⁹ Abstracts of several research studies being conducted in France as well as in other countries, with a focus on validation of knowledge and accreditation of prior learning, are presented in the proceedings of 7e Biennale de l'éducation et de la formation, organized by INRP/APRIEF, that took place in Lyon, France, 13th to 17th April, 2004.

tions are being answered in different ways by the European countries that are presently giving more credit to practical experiences and that have procedures for accrediting non-formal and informal learning.

The Competence Reform in Norway

In Norway, as in other European countries, since the 1990s several steps have been taken through reforms and legislation to open up for the integration of all forms of learning (Tarrou & Holmesland, 2002). These steps include formal, non-formal and informal learning as part of the general lifelong learning strategy for the 21st Century. One important concern has been the validation and accreditation of non-formal and informal learning, as part of a broader view regarding adult education. The most common forms to assess non-formal learning have been based on tests or exams, how the competence is applied (CV), results, and description of learning environments.

Among the several methods applied in Norway for validation of non-formal learning, the main approaches have kept a special focus on three aspects:

- individual rights, by lowering barriers to re-enter formal education
- flexibility, by increasing mobility in the labour market, and
- individual and organisational learning, by stimulating informal learning and improved learning environments in the workplace

The recognition of the need to raise competencies of all individuals, inside and outside the labour force and the acknowledgment of the importance of all forms of learning, has pointed toward the necessity to offer better opportunities for lifelong learning. The result was the Competence Reform which was launched in 1999 as part of a comprehensive reform of the Norwegian educational system¹⁰. This reform is part of several changes that have taken place in the educational system and has had the purpose of opening new paths for the recognition and acquisition of learning. Being an educational reform and a workplace reform, it was aimed at adults needing education at all levels and includes those who are employed as well as the unemployed. Thus, it is based on a quite broad concept of knowledge acquisition. It has also a long time perspective and it has been implemented through the active contribution from employers, employees and the Government (OECD, 2000).

¹⁰ The process to implement the Competence Reform (Realkompetansereform) began in 1999. The reform is based on a report from a Government Committee in 1997 (NOU, 1997: 25 and the White Paper No. 42 to the Norwegian government (KUF, 1998) which was debated by the Norwegian Parliament in January 1999.

The reform has several objectives and among them is the admittance of students to higher education. Projects were initiated in the autumn of 1999 whereby students were admitted on the basis of non-formal learning to certain studies at some institutions of higher education. Admission was based on either written/oral tests, age combined with guidance/self evaluation, or relevant work experience. The Government presented a bill to the Norwegian Parliament in May 2000 proposing a legal amendment giving universities and university colleges the right to admit students without formal entrance qualifications on the basis of age (25 years or older) and non-formal learning. The institutions were given autonomy to decide if the student is qualified. If the student completes an examination in a study programme of one year's duration, this will automatically provide him/her with general entrance qualifications. Non-formal learning can also lead to shortening studies by exempting from examinations or tests.

The admittance of students with non-formal and informal learning in higher education has been confronting established beliefs about academic requirements for attending higher education. At the start, several educators expressed their views and scepticisms regarding the success of implementing an educational reform that supported the admittance of students without formal learning into higher education. Among them, the theologian, educator, and politician Inge Lønning, active in the Conservative Party of Norway, expressed the need for more debate because the students should have a clear view of the requirements for succeeding (Lønning, 2001). He indicated, thus, a concern shared with other educators about the importance of students having the necessary academic preconditions for fulfilling higher education. As recruitment today ought to be based on the widest possible inclusion of social groups, independent of gender, ethnicity, and geographical location, a great challenge facing Norwegian higher education is to combine the demands for high quality in teaching, learning and research with the least possible exclusion of students. This was an important concern of the group that authored the report "Freedom with Responsibility". The thought was expressed in this report by asking the following question: "How to handle differences in a society that is favourably inclined toward the most possible egalitarian system?" (NOU 2000:14, s. 25). The question is complex and not easy to answer. It can also be equally difficult to answer other questions related to the admittance of students on the basis of their non-formal/informal learning such as: Are the aims of the Competence Reform realistic? Does the implementation of the Competence Reform require special pedagogical efforts? Are students without formal qualifications able to succeed in completing a higher education programme?

These are examples of questions that a group of teacher-researchers was asking when the implementation of the Competence Reform started at Akerhus University College. At the time there were no previous studies about

educational programmes that had admitted students on the basis of non-formal/informal learning. It was only in 2004 that NIFU published a report that referred to the Competence Reform (Helland & Oppheim, 2004). To answer the questions referred above, it was decided to carry out a longitudinal study that lasted for three years. The purpose of the study was:

How and to what degree the programmes at Akershus University College meet the needs of students accepted on the basis of formal learning and/or non-formal/informal learning as well as the demands of the job market.

The implementation of the Competence Reform at Akershus University College

The booming economy of Norway in the beginning of 2000 and its national population of about 4.8 million people required a larger pool of qualified people to fill all the jobs offered in the market. However, this reason did not stand alone to justify the implementation of the Competence Reform. One must also consider the changes happening worldwide. These changes press individuals toward a state of permanent knowledge acquisition, which also has forged the term lifelong learning in today's knowledge industry.

The importance of providing education and training to as many people as possible in the adult population and updating the competence of the work force in a lifelong learning perspective brings us to the particular case of the articles in this book. They discuss the implementation of the Competence Reform at Akershus University College in three educational programmes that admitted students on the basis of non-formal/informal learning. The programmes of Facility and Service Management (FSM) and Institutional Catering Management (ICM) were located in the Faculty of Technical and Vocational Teacher Education.¹¹ The other one was in the Faculty of Nursing. All the students with both types of background, i.e., formal and non-formal/informal learning¹², attended the programmes

¹¹ After Facility and Service Management (*Husøkonomi og serviceledelse*) and Institutional Catering Management (*Kostøkonomi, ernæring og ledelse*) developed into 3-year bachelor programmes, their Norwegian titles have changed slightly. Institutional Catering Management (ICM) has changed its English title to Bachelor in Food and Catering Management (BFCM).

¹² In the Norwegian context, *formal learning* or *formal competence* means knowledge acquired at the upper secondary school level and which qualifies for entering higher education. *Non-formal/informal learning* or *non-formal/informal competence* means learning that occurs at the workplace and, when properly documented, can be assessed for the purpose of taking further education. Adults over 25 years of age without formal entrance qualifications can be assessed by institutions of higher education, which determine whether the non-formal qualifications are acceptable for entering their programmes.

together in the same group. Among the students with formal learning some of them had relevant work experience in addition to having completed upper secondary school.

The aim of AUC's faculty members involved in the studies was to illuminate questions related to the learning of students accepted with different admittance criteria. Although located in the same institution of higher education, the teachers in these educational programmes had different experiences in working with students without formal learning, as is further presented and discussed in each one of the following articles. However, the three programmes shared the common interest of investigating the implementation of the Competence Reform. Their research approach was similar but was carried out preserving each of the programmes' specific purposes and aims. All projects combined quantitative and qualitative methods. The quantitative research data were collected by means of questionnaires comprising open and closed questions. The qualitative data were obtained by means of interviews. Being a longitudinal study, all data were collected in a time span of approximately three years.

The research project about the implementation of the competence reform started in the autumn of 2000, initially in FSM and in FCM, which had the longest experience in the recruitment of students with non-formal learning at AUC. These two projects are described, respectively, by Judy Deanne Lundin and by Hans Risan. In May 2001, the Faculty of Nursing education became interested in carrying out a similar research with the same focus. The educational programme in nursing had different background and reasons for participating in the project, and these are presented and discussed in the article by Kjersti Sortland. Puzzled by results of the students' performance in the projects, especially in regard to their science literacy, a newly hired colleague, Knut Boge, carried out in 2008 a study in which he investigated how students with formal and non-formal/informal learning performed in the module of Accounting and Managerial Economics. This article is also presented and discussed in this book.

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The Competence Reform in the Faculty of Technical and Vocational Teacher Education

Judy Deanne Lundin and Hans Risan

The educational programmes in Facility and Service Management (FSM) and in Food and Catering Management (FCM) were established in the 1950s when there was no prerequisite for formal learning, i.e., completion of upper secondary education. Having the longest experience in the recruitment of students with non-formal learning at AUC, these programmes initiated the study. However, with the reforms on all educational levels in Norway in 1994, and especially in higher education with newly revised laws for universities and colleges in 1995, entrance requirements were changed and demands for a minimum level of formal learning were introduced. Since 1994, students applying to the FSM and FCM Programmes must have a minimum of formal learning and a trade certificate, which might be replaced by two years of relevant work experience. As the age of the students attending these programmes has varied from 20 to over 50 years, many of them have many years of work experience.

As a consequence of the Competence Reform in higher education (NOU, 1999:17) in the autumn of 2000, all programmes at AUC were granted permission by the Ministry of Education to admit students on the basis of non-formal learning for a trial period of one year. It must be pointed out that this was not an exception for AUC. The Norwegian Parliament had passed legislation stating that universities and university colleges have the obligation to consider and evaluate documented, relevant non-formal learning as the basis for entrance to higher education, for students over 25 years of age, according to the Law for universities and university colleges (UFD, 1995).¹³

Throughout these periods with different entrance requirements, teachers in the programmes in FSM and in FCM had already observed that sound job experience was a positive factor for the completion of the educational programmes just as formal learning provided its own specific advantages. Thus, students with these two different backgrounds could have similar and different experiences related to the study programme. These observa-

¹³ LOV-1995-05-12-22, changed by LOV-2003-06-27-70 from 2003-07-01, §37.

tions had, however, never been systematically documented and analysed for research purposes, except for a research-based self-evaluation of FSM and FCM that was carried out spring 2000, whose focus was the programmes' content and relevance to the job market (Tyldum, et al., 2000). The evaluation was based on information given by the following people:

- faculty members
- student representatives
- representatives for graduates
- representatives from companies employing the graduates
- representatives from relevant professional organisations

Results of the interviews provided relevant information which was used to improve and develop the programmes. The results of the self-evaluation and the experience that faculty members and researchers gained in working as a team, led to the decision to extend the evaluation into a project with the following problem statement: "How and to what degree do the programmes in FSM and FCM meet the needs of students accepted on the basis of formal learning and/or non-formal/informal learning?"

A group consisting of 46 students, 17 students in FSM and 29 students in FCM was followed up during the 2-year programme at AUC. Among these, 16 students, 8 from FCM and 8 from FSM, were purposively selected to be interviewed during the 2-year programme at AUC and again after one year in the job market. During those three years much was learnt about how the programme met the needs of the students with and without formal learning. By a systematic interaction with them, the teachers have adapted the programmes to the students' needs and demands of the job market. The findings and their applications to changes in FSM and FCM programmes are further discussed in the articles written by Judy Deanne Lundin and by Hans Risan, respectively.

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Research in Facility and Service Management

Judy Deanne Lundin

Background and Programme

The programme in Facility and Service Management has its roots in the traditional home economics education from the 1950s. That was a type of vocational education for homemakers, a group that consisted of women who were responsible for administration of their homes and families. Some of the women became administrative housekeepers in public and private health institutions with the responsibility of cleaning, laundry, hygiene, food service and the budgeting of all services. It was these administrative housekeepers that in the 1950s felt a need for establishing a professional organisation – the Norwegian Administrative Housekeepers Association (Norske Husøkonomers Forbund)¹⁴. In 1955, the administrative housekeepers established the National School for Administrative Housekeepers, which became later part of Akershus University College, with the title of Facility and Service Management (Ulvestad, 2005). This was a 2-year programme which, in 2002, developed into a 3-year bachelor programme. The focus here is on the project carried out in the 2-year programme, whose purpose was to investigate to which degree the Facility and Service Management educational programme (FSM) met the needs of students with formal and non-formal/informal background.

Formal learning became an admittance requirement to FSM in 1995. Such demand implied the need for a graduation certificate from upper secondary school, and passing grades in Norwegian, English, social studies, mathematics, and science. This stricter requirement established a barrier for the admittance of applicants with a background based on practise. However, the developments toward democratisation of knowledge and demands for a qualified work force triggered discussions aimed at changing educational policies and facilitating further education of adults. The establishment of the competence reform was a consequence of the need to facilitate adult education and create greater opportunities for lifelong learning in Norway.

¹⁴ About the same time the administrators of kitchens in hospitals organised themselves and established the Norwegian Association for Nutrition and Dieticians (Norsk Forening for Ernæring og Dietetikk – NFED)

In the fall of 2000, the programme in Facility and Service Management at AUC admitted a total of 17 students. Most of them (about 65%) were accepted on the basis of non-formal/informal learning and their ages varied between 21 and 50 years. About 47 % of the students admitted on the basis of non-formal/informal learning were 30 years old or older (see Table 1). A chi-square analysis indicated that the predominance of older students in the non-formal/informal learning group was significant ($p \leq 0,05$). However age does not seem to have been a barrier for the students to complete the programme, as the two dropouts belonged to the younger group, 21 to 30 years old (see Table 2). Note that all the students, with both formal and non-formal/informal learning were, placed in the same group and the teachers, were not informed about the students' educational background.

Table 1:
Distribution of students according to educational background and age

Background	Age		
	Up to 30 years	Over 30 years	Total
Formal learning	5 (62,5%)	1 (11%)	6 (35%)
Non-formal/informal learning	3 (37,5%)	8 (89%)	11 (65%)
Total	8 (100%)	9 (100%)	17 (100%)

Table 2:
Distribution of students according to age and completion of degree

Age	Facility and Service Management		
	Admitted	Completed	Dropped out
21-30 (yrs)	8 (47%)	6 (40%)	2 (6%)
31-40 (yrs)	3 (18%)	3 (20%)	–
41-50 (yrs)	6 (35%)	6 (40%)	–
Total	17 (100%)	15 (100%)	32 (100%)

Research questions and students background

There was a systematic follow up of the students during the two-year programme in FSM. A purposive sample consisting of 8 students and based on the students' interest to participate in interviews was established at the beginning of the 2nd semester. These students were interviewed three times during the programme. The last interview was conducted at the end of the second year, after the exams. These students were contacted once again, one year after graduation.

At the start of the project, the teacher-researchers were aware about the difficulties of carrying out a longitudinal study during a three-year time span, but they were also very motivated and curious regarding the pro-

ject's outcomes. How positive would the students be toward answering questionnaires? Would any of them be interested in being interviewed during a period of three years? How available would they be for such interviews? Especially important were the questions aimed at the students with non-formal learning. How did they feel about their qualifications to fulfil the programme? Which difficulties did they encounter? How did they overcome such difficulties? Did these students demand special efforts from the academic staff? Would a group consisting of students with formal and non-formal/informal learning require special teaching methods? All these questions and many others are addressed in this article. However, not wishing to take away the curiosity of the reader, the first question chosen to be addressed was:

How well have the students with non-formal/informal learning performed as compared to students with formal learning?

Table 3 presents the rate of success of students with both types of educational background at the end of the 2-year programme. The rate of success of students with non-formal learning was quite high, 88% of the total number of students in the group. In the group of non-formal learning students, two of them (18%) did not complete the programme.

*Table 3:
Distribution of students according to educational background and degree completion*

Degree	Facility and Service Management		
	Formal learning	Non-formal learning	Total
Completed	6 (100%)	9 (82%)	15 (88%)
Not-completed		2 (18%)	2 (12%)
Total	6 (100%)	11 (100%)	17 (100%)

By starting with the final results, the intention is to raise the readers' interest to know more about how the students with different backgrounds experienced the programme and how relevant this knowledge was for their work life one year after completing the programme. Thus, this project addressed several questions which are also relevant to education of adults in general, and to the relationship between education and work.

The completion of an educational programme is likely to be linked to the motivation of the student. The reasons the students have given for attending the programme are summarised in Table 4.

*Table 4:
Reasons for applying to the Facility and Service Management programme*

Reasons	Facility and Service Management
Need for competence in management	3 (20%)
Self realisation	8 (53%)
Re-education for health reasons	4 (27%)
Total	15 (100%)

The major reason for applying to the programme was self realisation. Other reasons mentioned were the need for re-education due to health reasons, and the desire to attain higher competence for taking on management responsibilities. Scattered reasons were the desire for greater challenges and higher salary. It seems that ambition and motivation to complete the programme were quite high among the students independent of their background. However, students with non-formal learning were more inclined to regard education as a way to increase job possibilities. This attitude expressed by the students is in agreement with the assumptions pertinent to learning in adulthood stated by Knowles et al. (1998).

Prior relevant experience

Most of the students had work experience relevant for the programme, and it ranged from 24 months to 28 years. The majority of the students in Facility and Service Management (53%) had already worked in leadership positions. This was probably due to the fact that students with non-formal learning were older than students with formal learning, and had, therefore, longer job and life experience. Information from the interviews, which are summarised in Table 5, indicated that having work experience, especially having worked as a leader was very relevant for the programme. Such experience was certainly quite advantageous for some of the modules as organisation and leadership or organisational psychology, for example.

*Table 5:
Work experience specified by the students as relevant*

Reason	Facility and Service Management
Work in the specific professional area	5 (13%)
Work as a leader	8 (53%)
Trade certificate	1 (20%)
Practise	1 (20%)
Total	15 (100%)

Students with formal learning seemed to be more self-confident than students with non-formal learning, as the former were more used to writing and reading texts related to the topics of the different modules. However, although these students had more “formal knowledge”¹⁵ in science and mathematics, they also indicated the need to work hard in these disciplines:

Chemistry was demanding and the most difficult. (formal learning student)

Chemistry is terribly difficult. I think that accounting is difficult. (formal learning student)

Expectations regarding the programme in Facility and Service Management

In the first semester, the students answered a questionnaire and expressed their expectations regarding their studies, which are summarised in Table 6. The respondents expressed often the wish to become good leaders and managers, and have a sound knowledge in their specific professional areas. Their answers indicated a strong interest for self-development, and they appeared to be highly motivated for completing the studies and becoming good professionals. Although Stevenson (2002) raises questions about generic knowledge being transferable to the workplace, the students’ wishes to have theoretical knowledge about leadership skills can be inferred as being a good platform for further development in the profession. To build knowledge at the workplace was probably important for these students as they indicated also to be interested in middle-level administrative positions, either in the private or public service, as expressed by a non-formal learning student:

To start with, I want to be a facility manager in the municipality, where I have 12 years of experience.

Table 6:
Expectations regarding the programme

Expectations	Facility and Service Management
Leader competence	3 (20%)
Professional knowledge	8 (53%)
Both, leader competence and professional knowledge	4 (27%)
Total	15 (100%)

¹⁵ “Formal knowledge” here means knowledge acquired within the formal learning context

During the second semester of the first year of studies, the students were asked to express their views about the FSM programme during in-depth interviews carried out with a sample of 8 students. Half of the sample consisted of students with formal learning and the other half were students with non-formal/informal learning. The questions were related to the modules’ implementation, and focused on the amount of readings, their levels of difficulty and relevance of the literature to the profession and more.

Students opinions and experiences with the programme in their first study year

The amount, difficulty level and relevance of literature

The students expressed some dissatisfaction with the curriculum literature. 47% of the students considered the texts in the books very difficult. Criticisms regarding the texts and comments about the difficulty in understanding the content were shared by students with both types of background, who expressed their opinions by saying:

There should have been a book easier to understand in cost analysis. ...The book in microbiology is very difficult. (non-formal learning student); *The book in economics should have been changed due to language and form of expression.* (formal learning student)

Aware of these difficulties, the academic staff took the comments of the students into consideration in their teaching methods (Holmesland et al., 2003; Holmesland et al., 2002). For example, through laboratory sessions, learning became more contextualised and efforts were made to construct science literacy socially. The laboratory sessions allowed the students to have closer interactions among themselves and with the academic staff. In addition, the academic staff made efforts to make the professional language clear to the students.¹⁶ Such efforts were beneficial because they resulted in students’ being able to better understand concepts. Communication between students and the academic staff was facilitated and the students indicated that they were able to have a grasp of the profession’s concepts.

¹⁶ For a comprehensive discussion of the importance of professional language for learning and “knowing what” and “knowing how”, see Askerøi (2005, 2006).

The amount and level of difficulty of written activities/tasks

Written texts produced by the students were considered important in the learning process, independent of the students' background:

You learn more when you write down on paper what you think you have learnt or believe you have learnt. I see that I have to write and formulate sentences so that others can understand. (non-formal learning student)

The production of their own texts was considered important by students with formal learning, as one student expressed:

I think it is fine. I get to express what I mean. One learns from what one writes. (formal learning student)

It was interesting to hear that students with non-formal learning, whose background was based on practise, considered self-produced texts as important for their learning as well. Even though writing might not be easy, it is not impossible to accomplish, as expressed by one student with non-formal learning, who referred to the difficulty of getting into the process of writing:

Terrible, but fine when one has gotten into it, ...difficult to start.

The students' opinions regarding the programme's demands on their literacy, i.e., their capability to understand and to write texts that were pertinent and relevant to the themes studied, made the academic staff aware of the importance of the context in their teaching. The relevance of contextualising the teaching is discussed further on in this article.

Group and project work

During the programme, the students had to carry out some *group and project work*. The majority of the students in the programme claimed to have little experience in working in groups. Although they regarded group work and projects as very positive, they also said that it can sometimes be difficult to co-operate with each other or to find the time to participate in group activities. Group projects were required because it is known that the ability to work in teams is very important in working life for the establishment of communities of practise (Wenger, 1998). Overall, in spite of some difficulties, students in the FSM group seemed to be positive about project work and described it as an important way of learning, as stated by one student with non-formal learning:

It is very interesting. I have actually tried to work together with different types of people. It is not always simple – the others are not always as eager, you have to pull them along. For many people it is an unusual way of working – you have to learn to do it.

One concern expressed by the interviewees was related to how the members work together:

It is fine as long as the group members agree about when to meet, group rules, attending the meetings and maybe how the group will arrive at the final product of the project. (non-formal learning student)

The first project was a nightmare. After that, it has been fine... I would like to have more rotation in the group members. (formal learning student)

It is very interesting. I have really tried to work together with different types of people. It is not always so simple... (non-formal learning student)

The students emphasised the importance of having a well-functioning group by saying:

I have actually tried to work together with different types of people. It is not always so simple – the others are not always equally eager, you have to pull them. For many people it is an unusual way of working – you have to learn it. (non-formal learning student)

I have had bad experiences until now and therefore I think that the teachers ought to organise the groups – in a way that one can work with students with different experiences. Then we can profit from each other's experiences, and this is very valuable. (non-formal learning student)

A student with formal learning claimed to have learnt a lot from group work:

I was stressed a lot in the first project, the one on professional identity. I had never done it before. Now, in the project in hygiene, we think things are going very well. The group functions very well.

From these quotes it can be inferred that group work provided the students with learning opportunities that went beyond mastery of the content. Through group work the students established communities of learn-

ing and were able to develop their social and leadership skills. These skills are very relevant for working life. Being a good leader is one of the goals expressed by all the students.

In spite of initial difficulties, projects carried out by groups gradually became an accepted work form, and it was generally understood that the composition of the group is an important part of the process. Group work provided the students the possibility to develop social skills while acquiring new knowledge. The combination of knowledge acquisition with social skills is very important in the workplace. As indicated by Gee (1996, in Searle 2002, p. 27), it is critical to create opportunities for the staff to acquire the *social literacies*, which are understood as unofficial knowledge of the workplace. While carrying out the projects in groups, the students had an opportunity to develop such skills in the context of higher education. Whether these skills can be transferred to the workplace is questionable, according to a study done by Searle (2002, p. 17):

The results suggest that actual workplace practises involved socially constructed literacies, which depended on the user's ability to make judgements on how to use the text or obtain information from within the text for site specific purposes. Furthermore, use of oral language varied with the context and participants. Successful communication seems to depend on the ability of staff to make inferences based on knowledge available to them within the social context of the specific worksite.

It is important to add here that the groups comprised FSM students with and without many years of varied work life experience. The pedagogical purpose of group projects was to provide the students with opportunities to share knowledge and experiences that could be useful in the work life. Feedback received from them about their work life one year after their graduation indicated how they profited from these experiences. A non-formal/informal learning student claimed to have developed skills that made her feel confident in her middle management position when discussing issues with other employees as well as senior administrators.

Evaluation and exams

The students also expressed their views about *evaluation and exams* and stated how they react when being evaluated. The students regarded evaluations in general as very important. Some claimed that they would like to have had more frequent feedback about how they were doing in the programme. Overall, irrespective of background, the interviewees expressed a dislike for exams:

I don't like exams because of the pressure of time. You have to show what you are able to do within a limited amount of time, said a FSM student with non-formal learning.

Another concern expressed is that how one is feeling on the exam day can affect the result. The interviewees were unsure about where they stood academically, and some expressed the opinion that exams should be abolished. Some interviewees expressed fear primarily related to specific subjects. Accounting and managerial economics was one of these. A student with formal learning expressed the same kind of fears by saying:

I am terribly frightened, especially in the discipline of economics and the part on leadership. We have received evaluations of pass/fail in our work and suddenly we receive a grade in the exam. I would have liked to have received grades during the academic year in order to have an indication of my level and an idea about the grades.

Summarising, one can say that according to the interviewees, there was a general fear of exams among the students with formal and non-formal learning. A general concern expressed by the students is the lack of an indication of how prepared they are for the exams. Some interviewees expressed the wish for an indication of their progress in the courses prior to the exams, preferably in the form of grades. Both groups of students gave many reasons for their negative feelings toward exams, such as “a bad day”, not feeling well or excessive nervousness. Some would prefer several evaluations during the year rather than a one-day exam as the basis for evaluating the students' performance for the entire year. This comment was very important and was taken into consideration in the changes introduced later in the three-year bachelor programme. The new programme was modularised and since then, the evaluations, advising and grading are provided for each module.

The use of professional terminology and amount of theory in teaching

The students attending the FSM programme considered the professional terminology used by the teachers as quite understandable, however they claimed that there was too much theory in the teaching. Interviewees with formal and non-formal learning shared some of the same concerns regarding difficulties in understanding the literature, especially within subjects that required science literacy such as chemistry, biochemistry and economics. However, it appears that after the initial culture shock of being back in the "formal education" environment, life tends to become easier, as expressed by a student with non-formal learning:

It is easier now. Everything is not so new now. We are better acquainted and no longer afraid to ask questions. Concerning the level of difficulty – now I have a better overview and see the relationships more easily. Everything is no longer so frightening. The level is much higher than what I have been involved with earlier. I had expected it, but it didn't help.

It appears that professional terminology is a problem for some students, especially in the beginning when they do not know the teachers and do not communicate so well (Lundin et al., 2001):

The literature was too difficult. I would like an easier form of expression. I almost need to translate to understand it. That applies almost to everything. I would prefer simpler language in the disciplines. It doesn't mean that the level becomes lower. (non-formal learning student)

In the first semester it was more difficult than now, especially accounting and cost analysis. The textbook is too difficult. There are alternatives that are easier to comprehend and understand than this one. The teacher has become better in dialogue with the students. (formal learning student)

However, things have become easier with time, as expressed by two students with non-formal learning:

It is easier now. We have become familiar with the terminology and the professional language. It comes after a while. I don't allow myself to become stressed because of this.

In the beginning I thought that accounting was terrible and the language used in the discipline was on a little too high level. Things are going better now.

These quotes illustrate what has been mentioned earlier in this text concerning the importance of facilitating communication between staff and students and making professional language understandable. This feeling was shared by students with formal and non-formal learning:

The teaching methods used

In general, the students seemed to be satisfied with the teaching methods used, especially those related to practical exercises such as laboratory experiments, procedures testing and study visits. They were also satisfied with the lectures, group work and written activities. However, those who had work experience (non-formal learning students) considered these kinds of activities as less necessary.

Concerning the lectures, students said that some were good while others were not as good. It was perceived as a problem when a student felt that the lecturer was not receptive to questions or presented the content too rapidly. In general, the students were positive toward group work; they thought they learnt a lot from the exchange of experiences. Regarding group work, problems could arise if there were too many members in the group because it was difficult for all members to meet at specific times.

Interviewees were positive toward written tasks. They expressed that it helped to see the content in a new perspective, to be forced to work with the subject matter and to learn how to express the ideas in writing. Two students with non-formal learning put it in the following manner:

You learn more from writing down on paper what you think you have learnt and now know. To be able to express yourself on paper is a very good way to learn, because it is difficult to make yourself understood.

Excellent. The more written work handed in, the more you learn how to express yourself.

A student with formal learning expressed a positive view on written work by saying:

It is all right because we learn from it ...written work is important, especially when one receives some feedback.

However, written activities are not always enjoyable, as stated by a student with formal learning:

I have never really liked written work. I like best to express myself orally. I would like to have oral exams.

The same student emphasised that working in a group had been helpful, by saying:

After I gained experience with group and project work, I think things have been better.

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Study visits

There were several visits to different companies during the programme. Their purpose was to bring practical aspects of working life closer to the students. During these visits they had the opportunity to learn from the companies how, for example, they created solutions for in-door climates. They were very impressed by some of the study visits and the solutions they had observed. However they were also capable of being critical. One of the students with non-formal learning said:

I have mixed feelings. There have been many interesting study visits, but I have the feeling that some of them were outside the professional field.

Another student, with formal learning, was also critical toward the amount of advertising, and said:

Many of the visits were unnecessary – some are relevant, but others have too much self-advertising.

These comments were very important since they reflected the sophistication and critical awareness of adult students regarding study visits. This feedback was taken into consideration during the organisation of the studies for new groups of students.

Laboratory practise

The interviewees were positive to laboratory practise, as said by two students with formal learning. One of them said that there

...should have been more of it in all disciplines where it can be relevant.

Another student expressed a positive impression of laboratory practise by stating:

Very good – actually this is the best way to learn and the way through which I have learnt most.

But some students have also expressed criticisms of experimental methods related to previous work experience. This opinion was expressed by a student with non-formal learning, who said:

Relevant, one learns from watching, observing and thus understands the relations. I am otherwise not so interested in the discipline of chemistry. Experimental methods in cleaning and the choice of methods were meaningless, because I already knew this from my work experience.

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These were important comments which gave the staff the opportunity to examine laboratory practise. They are also an indication of the value of previous practical experiences for the students.

Portfolio evaluation

Portfolio evaluations were introduced at the end of the second year of studies. From the interviews it was perceived that the students had received some unclear guidelines regarding this form of evaluation. In spite of the lack of clarity, all students indicated satisfaction with portfolio evaluations because they were perceived as an adequate means of documenting what one had experienced. However, the interviewees expressed some dissatisfaction regarding the first phases of organisation for portfolio evaluation. Some of the opinions are presented next.

I think that the whole thing is tiring. I think it should have been very clear from the beginning how and why we were to do what was asked of us, in order to avoid misunderstandings. (non-formal learning student)

In spite of the initial confusion, the portfolio was accepted as a new form of evaluation, as expressed by one student with formal learning:

It is fine, but I had never done it before. There was a little ifs and buts about how thing should be done.

However the usefulness of portfolio evaluation was recognised and expressed by another interviewee with non-formal learning background:

In the beginning I wondered what in the world it was. It is much better than having many tests. We can submit the evaluations when applying for jobs, as a way of documenting what I have done

during the time I studied. Everything is collected in a document. It is a positive form of documentation.

The second year of studies

In the spring of 2002 two new rounds of interviews were conducted with the same students. The first took place between the end of February and the beginning of April. The next round comprised exit interviews which were conducted with the same students interviewed earlier and took place during June, prior to and immediately after the 48-hour take-home exam, which was the last requirement of the FSM programme. Besides these interviews, in June 2002 a student evaluation was carried out by means of a structured exit questionnaire, answered by all the students.¹⁷

In the interviews, the students were asked to reflect upon their experiences with the programme. They described in what ways it had met or not met their expectations. They also expressed how they felt about their self-development during the past two years and towards becoming a professional and competent Facility and Service Manager. They also reflected upon how they had overcome a number of barriers and challenges encountered during their studies. In the exit interviews, the students gave additional information regarding how they experienced the 48-hour take-home exam. They also expressed their views and perceptions of the course content and their expectations regarding future employment. The students' concluding remarks regarding their learning experiences, how the programme met their expectations and how they perceived their own development are presented and discussed in the following section. These final remarks provided an initial step in the follow-up carried out one year after graduation.

One year after conclusion of the programme: Relevance of the FSM programme to working life

After completing their studies, the majority of the graduates spent the year working within their profession or taking additional educational courses. As part of the research, the graduates were interviewed once again. The focus of a new round of interviews was to give them the opportunity to express their opinions about how the studies had contributed to their performance in working life. Seven graduates in FSM spoke freely about:

- How they had developed professionally and personally during the year after graduation

¹⁷ This evaluation provided important information for the study on the implementation of the competence reform at Akershus University College as well as for changes made in the two-year programmes of Facility & Service Management and Food & Catering Management, by which these programmes were turned into bachelor degrees (Risan, 2009).

- How much they felt that education had contributed toward mastering their present job or, when applicable, any further education.
- How they had overcome the challenges they had met at work, or in their further studies
- How much contact they had with fellow students and whether they had established a network that could help them at work.
- The plans and expectations they had for the future related to their career and professional development
- The professional and personal qualifications demanded by the job market within their professional segment.

The interviewees provided important information about the relevance of the programme and its relation to their professional career. The following paragraphs summarise the graduates' main experiences in working life and especially how they related to AUC's educational programme in FSM.

Success factors in work related to background and study outcome

Among seven interviewees, six were working in the specific area of their educational training. One of them, a previous non-formal learning student, was not yet working because the student had to take an exam over again. Individuals working in their specific professional fields had been hired either as manager, assistant manager or group leader.

Not all the interviewees indicated they had a job in which they could fully apply the theoretical knowledge acquired during the studies. This was sometimes a source of frustration because it was felt that they might not be making use of their full potential when

... the others do not hear what you say, and you are told to be quiet because you do not understand this or that!

The same non-formal learning student added:

I answered by saying that I received a high grade on my final exam precisely on the topic of cost reduction. Therefore I should have a good understanding and be able to make suggestions about this topic!

This is just one example, among others, that suggests perhaps the need for graduates to be more assertive and determined in terms of the jobs for which they apply, as well as critical of the offers they receive. It appears that especially younger people prefer a job with less leadership responsibility that is more closely related to the tasks to be performed. They maintained that they wished to acquire more work experience before accepting jobs as managers.

An overall impression is that the interviewees indicated a strong concern about the value of their degree for the chosen profession. This inference is based on the attitude of the interviewees (formal and non-formal learning) toward the essence of their jobs. They seemed to be quite determined to advance their careers in the profession for which they were educated. Therefore, they wanted the activities performed at work to be linked to their educational background. When this was not the case, they resigned and applied for another job more related to their educational training. Some of the graduates had accepted middle level leadership positions, which was perhaps a good strategy for those beginning in the profession. They then had the possibility to apply for new positions and be promoted within the same organisation.

The interviewees' overall impression about the impact of their education was that it had given them a good platform for development. Another important feedback for the programme was that a lot of what was taught about personnel management and organisational development was found to be relevant in their current jobs. One interviewee emphasised the importance of this kind of knowledge and stated that about 75% of the workday was spent in activities requiring leadership skills. It was also mentioned that a higher level of knowledge contributed to increasing their self-confidence and ability to lead a group of subordinates. Thus, they considered the ability to communicate and stand in front of a group to be an important asset for a leader. According to the interviewees, this was something that the study programme had contributed to their development, thereby increasing their competence.

Regarding the programme's content, the need for more individualised activities during the courses was mentioned as important in order to build the students' self-confidence in their ability to work alone. This was a constructive criticism offered by several students, including in the interviews carried out during the studies and in the exit interviews. They justified their desire for more individualised activities by noting that individual activities would provide them with more direct feedback about their individual performance. However, the interviewees also indicated that experience with project and group work was very important for their performance within the profession. In addition, they said that they had established very strong links with their former classmates. These links were often reactivated through informal contacts by telephone, e-mail and occasional meetings in which they discussed the new challenges in the market place. They also consulted former classmates on professional matters, perhaps creating the so-called "community of practise" (Wenger 1998).

The interviewees also commented positively about the importance of what they learnt in organisational development. Concerning the area of accounting and managerial economics, they routinely mentioned that

what they learnt was important, although sometimes difficult for some of them. Most of the interviewees expressed the wish to learn more about these topics. This is interesting because during the programme the majority of the students, with both formal and non-formal/informal learning, expressed fear and lack of competence in quantitative subjects, especially in accounting and managerial economics and in chemistry. They had to work very hard during the programme but felt rewarded when they overcame the barriers. They admitted in the interviews that this kind of knowledge is both needed and important in the workplace.

All the interviewees mentioned that they were interested in continuing their education by taking a third year of studies leading to a bachelor degree.¹⁸ Some of the interviewees were attending a programme in teacher education and one, parallel with the coursework, was teaching in the vocational area in upper secondary education.

Relevance of learning experiences during the FSM educational programme

Regarding the experiences within the programme, the students expressed positive feelings about their learning during the two-year programme. They indicated they had learnt a great deal and enjoyed attending the programme, as represented by the statement of one student with formal learning:

It has met my expectations in the sense that I have learnt a lot

When specifying the learning experiences, the students made it clear that they were quite satisfied with what they had learnt through project work. One of the students expressed it by saying:

I was sceptical about project work in the beginning. But I feel that I have learnt most from it, in the sense that I was trained to think comprehensively, in building up the whole project and also in writing. (formal learning student)

From the interviews it was inferred that neither of the two types of background, i.e., formal or non-formal/informal learning, seemed to have provided immediate knowledge during the studies about the content in the programme. Once again it was mentioned that it was necessary to work hard to overcome the difficulties in some disciplines, as for example in Accounting and Managerial Economics.

The researchers were also interested in identifying ways the programme met or did not meet the students' expectations. Most of the interviewees referred

¹⁸ At the time these interviews were carried out, AUC had not yet begun offering a 3-year bachelor program in Facility and Service Management and Institutional Catering Management.

to management and leadership as a content area of great interest during the programme and one that made them aware of the importance of knowing how to be a good leader. They also emphasised the importance of this experience in the workplace. Some of them had even expected the programme to place greater emphasis to this content area, which they considered very relevant for any manager leading a business organisation.

When I started at work on July 1, 2002, I had to stand in front of 100 employees and tell them about the situation at that moment and what would happen ahead. (Non-formal/informal learning student)

Another former student (formal learning) mentioned the importance of being a good leader:

Because I have a management position in my job, I must get to know each of my subordinate co-workers. At the same time, I must delegate, gain their respect and in turn respect my co-workers and other colleagues. I must plan, organise and establish procedures, routines and methods, in addition to making sure that equipment and cleaning agents are available – everything that is necessary.

Beyond all this “...you have to motivate the co-workers” was a comment from another interviewee (formal learning student).

One of the interviewees expressed the wish that the content in Accounting and Managerial

Economics had been more oriented toward professionals within the field of facility and service management (former non-formal learning student). Thus, competence in accounting and economics, together with leadership skills, was pointed out as the key to successful management. Another interviewee (non-formal/informal learning) emphasised the combination of these two sides of management in relation to their work:

I am supervising about 100 people. I learn something new and am challenged all the time. I have responsibility for accounting and economics, as well as the daily operations.

Concluding remarks: Implications of the results for teaching and research

The researchers initiated this project without an “a priori” theory. Little research had been conducted previously on the Norwegian Competence Reform and the studies in progress had focused primarily on documentation of non-formal learning. Thus, due to project’s initial detachment from a specific theoretical basis and the need to generate concepts from the data for explaining the phenomena researched, a grounded theory approach to qualitative analysis (Glaser & Strauss, 1967) was used

throughout the study conducted in the FSM programme. The same approach was also applied in the other AUC educational programmes that carried out similar projects parallel with FSM’s project, and to which reference is made in the introduction of this book. Although the results presented in this chapter refer only to the FSM project, the reader is invited to examine the results from the other projects in terms of the many commonalities between them that touch upon theories of teaching and learning and on adult education. In the case of the Facility Service Management (FSM), the project was carried out parallel with and sometimes jointly with the Institutional Catering Management (ICM)¹⁹ project. The reason was the partial commonality of these programmes’ content in the area of administration and management. However, despite their symbiosis, and in order to preserve the uniqueness of the results in FSM and ICM projects, they are presented separately. Table 7 presents a summary of the backgrounds of the students who participated in the two projects and the links between practical activities and learning.

*Table 7:
Background of students and the programmes’ learning activities linked to practise*

Programme	Background of students admitted to FSM and ICM programmes	Learning activities linked to practise
<i>Facility and Service Management (FSM)</i> Age span 20 to 50+ and <i>Institutional Catering Management (ICM)</i> Age span 20 to 50+	<ul style="list-style-type: none"> • Formal learning with or without relevant work experience • Formal learning with a trade certificate included and, in some cases, additional work experience • Non-formal and/or informal learning with a trade certificate, or equivalent, totalling 5 years of work experience, and a minimum of 25 years of age. Some applicants have additional work experience • Documentation of necessary Norwegian language competence to follow the programme 	Formal practise was not included in the programmes. However, among other learning methods, the programmes emphasised group and project work. Students were organised in groups with diverse backgrounds and experiences so that they could learn from each other. In project and field work the students visited companies and institutions where they gained insight into the practical side of their future profession. Students who felt they lacked sufficient work experience often took week-end and summer jobs that were relevant to the programme

¹⁹ The ICM project is presented and discussed in detail by Risan (2009).

As the conclusions presented here focus on the results of the FSM programme, the attempts to draw on theory are marginal. A comprehensive theoretical analysis is made in the last article of this book, drawing upon the results of all projects and relating them to more recent theoretical developments in learning and professional practise. Thus, these conclusions focus mainly on results that will be integrated with the results of the other projects in order to reach a theoretical understanding of lifelong learning in the post modern society. In these conclusions the author reflects upon the challenges met by adults – young or older – in formal learning situations in higher education, and whether their varied background, i.e. formal or non-formal/informal learning and amount of work experience, facilitate or impede knowledge acquisition. Therefore, it has been important to examine the kinds of teacher-created learning situations that stimulate adults in their effort to broaden their knowledge and to cope with the inherent challenges of formal learning in higher education.

One important finding derived from the empirical data and the interviews carried out during the two-year period is related to the students' inner psychology, i.e., how they assessed their preparedness to receive formal higher education. It seemed, at that time, that students with non-formal learning might have felt somewhat inferior in comparison to students with formal learning, especially in terms of their ability to complete the educational programme. They were especially concerned with subject areas that required background in the "hard sciences", for example, mathematics, chemistry and biology. However, when it came to expressing opinions about the difficulties encountered in the programme, students from both groups expressed the same fears regarding the areas that required background in exact sciences. The expression of such fears indicated that in some of modules, teachers would need to take this weakness into account in the context of their teaching.

One aspect students mentioned as important for their learning was their "dialogue" with the teacher. When there was a good dialogue, the students maintained, it was easier to ask questions. This appeared to be even more important in disciplines related to exact sciences, such as mathematics/accounting and chemistry, in which the students felt they were weak. Closeness to the students, gaining their trust and inculcating a feeling of team participation were emphasised as important aspects that teachers should consider.

Among the teaching methods used, exercises in the laboratory were pointed by students of both backgrounds as very valuable for their learning. It was inferred that the students felt they learnt better when teachers related theory directly to the students' past experience and to their future work situation. One conclusion is that teachers ought to adapt their teaching so as to relate theory to practical use and understanding. Although this

may appear obvious, it is important to emphasise that teachers should be continually aware of this focus when planning and carrying out their activities. It is important to remember that the adult students come from a world of practical experience. It is therefore important that teachers are able to relate the theory to the practical situation.

Another finding relevant for teaching refers to lectures requiring comprehensive and interdisciplinary knowledge. These lectures seem to be more likely to foster positive learning results when preceded by reading assignments, by a preparatory lecture and/or by exercises. It is important to have the proper focus, select the appropriate areas within a discipline and find the most productive working and learning methods for the students.

Project work was regarded as a good learning tool by students from both groups, although some criticism was voiced about how the groups were put together and about the varying degree of participation and contribution to the tasks group members were assigned. Thus, it was important that the teachers are aware that they might have to intervene and perhaps take on the role of mediator whenever the students are unable to resolve conflicts. However, the students did not dismiss project work as a learning tool. They considered it as a very good way to learn, and it was considered important to continue using and developing this approach.

Attitudes towards individualised work were very positive. The students expressed that they wanted more individualised work followed up by direct feedback on their performance. This information was taken into consideration when evaluating and restructuring the application of portfolio evaluation in the subsequent year. Thus, although at the start the students seemed confused and reacted negatively toward portfolio evaluation, their feedback resulted in a restructuring of the content sheet defining the work requirements, and relevant changes were made.

Another change was the redistribution of the ratio between the amount of group work and the amount of individualised work. The number of individual activities was increased and the students were given the opportunity to choose the method for carrying out assignments. It was decided to require four individual assignments. The students were given the opportunity to work in dyads or triads, due to the variety of topics they were able to choose. One of the consequences for teaching has been the awareness of the need to place more emphasis on helping the students to understand professional terminology, study approaches and work methods. The teaching staff kept in mind the need to intensify the guidance/tutoring given in the first months. The students also indicated the desire for a personal academic adviser.

Recommended literature was reviewed and adjusted before the start of each academic year. When recommending literature for the new academic year, the teachers made their revisions on the basis of each year's student evaluation.

One important concern in the project was to find out whether the students with the two types of background performed differently on the exams. An analysis of the results from the exams taken at the end of the first year revealed no significant relationship between the type of background (formal and non-formal learning) and the students' performance. The only exception was the exam in Accounting and Managerial Economics in which 44% of the students with non-formal learning failed the exam, as compared with 16% of the students with formal learning.²⁰ These results were taken into consideration in subsequent modifications introduced in the FSM and ICM programmes and are summarised at the end of these conclusions.

One of the findings that stood out among the results of the research is the importance for learning that students in the AUC educational programmes attributed to theory and practise (Holmesland et al., 2004b). This opinion was shared by students irrespective of the educational programme they attended. However, the proportion of emphasis on practise as opposed to theory appears to vary depending on the students' background. While the students with formal learning expressed their eagerness for more practical experiences, the students with a non-formal/informal learning background often indicated a strong interest in theoretical aspects. However, these students also emphasised the importance of learning that is useful in practise. This is exemplified by comments from two students:

There are things I can make use of, such as administration and psychology. I now feel much more comfortable about myself, both as a professional and as a person. (non-formal/informal learning student)

Last but not least, it is important to mention the changes in the FSM and ICM programmes for which the students contributed with their opinions. The results here have also been taken into consideration in the preparation of the 3-year bachelor in FSM and ICM.²¹ The next paragraphs report changes that took place in both programmes, which were carried out concurrently in a hybrid form during the implementation of the Competence

²⁰ This result caused concern, although it is interesting to note that the student with the decidedly highest grade result in the exam was an FSM student with non-formal learning. The second highest result was achieved by a student with formal learning from the other programme, Institutional Catering Management (ICM), which was conducted at the same time and is described in the next chapter.

²¹ The title of Institutional Catering Management (ICM) was changed to Food and Catering Management (FCM) in the new bachelor programme.

Reform at Akershus University College. At the end of the two-year programmes in FSM and ICM, all students answered a questionnaire in which they carried out a comprehensive evaluation. Together with the information that had been collected and analysed in the two previous years, this evaluation provided important input for the academic staff about areas needing changes and improvements in FSM and ICM.

All the aspects that the students considered to be positive, especially group work and the invitation of outside lecturers, were retained in the new 3-year bachelor programme that began in 2004. However, some students would have preferred that the programme had been organised in the form of modules, and this has now been implemented.

The students had been critical of the content in some subjects – some were found to be too easy and others too difficult, and students felt there was insufficient time for preparation. Accounting and Managerial Economics was mentioned as one of the most difficult subjects. Regarding this subject, several steps have been taken and are still being implemented to improve the students' performance.²²

The readers are invited to move on to the next article and become acquainted with the study carried out by the Institutional and Catering Management programme (ICM), renamed Food and Catering Management (FCM) in the new 3-year bachelor degree.

²² An in-depth study about literacy in mathematics and performance in accounting & managerial economics among students with formal and non-formal/informal learning has been carried out at AUC. Results are presented in the final article of this book.

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Implementation of the Competence Reform in the Institutional Catering and Management Programme

Hans Risan

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Introduction

As previously mentioned (Holmesland & Lundin (2009), non-formal/informal learning was adopted as a basis for admittance to higher education in the year 2000. During autumn of the same year, the first students with non-formal learning were admitted to the Institutional Catering Management programme. This group of students participated in a research project which aimed at investigating over a three-year period how students with this educational background mastered their studies and how their choice of profession compared with students with formal learning.

The educational programme in Institutional Catering Management was established in 1956 under the Norwegian title “Statens kjøkkensjefskole” (Norwegian Culinary Arts Institute). The programme aimed at training dietician managers for hospitals and other institutions ranging from boarding schools to the armed forces. From the very start, the school was closely associated with practise-oriented learning. Up until 1965 the program consisted of one and a half years’ practical experience in the field and, in addition, two theory courses with duration of three months each. From 1965 until 1979, the two theory courses were increased to a half year each, with a year of practise in between. Preferably the year of practise was to be divided between two institutional facilities (Ulvestad, 2005).

The practise year was left out in the new study programmes established in 1980, but regular teaching continued to attempt to build theory based on the students’ work experiences. In 1980, problem- and project-oriented teaching methods were implemented. The programme was among the first ones in Norway to implement this method in higher education. Emphasis was placed on developing the students’ ability to analyse and solve problems, as well as to collaborate in groups. Admission requirements were at this time completion of a three-year upper secondary programme as an institutional cook or equivalent thereof. The final year of the course of study for institutional cooks was a year of practise in the field.

In addition to the problem and project based teaching approach, dialogue based teaching and a strong emphasis on interactions between the lecturers and the students have played a central role in this programme. Practically speaking, this means that the students are invited to supplement the lecturer’s presentation by sharing experiences and viewpoints of their own. In this teaching approach, students with a long work and life experience seem to have the best prerequisites to contribute to the dialogue. Other instructional methods used include group discussions, case studies and role plays. Videotaped sessions offering the opportunity to assess behaviour during role play have also been used.

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The Institutional Catering Management programme was a two-year course up until 2003. In the study plan, food management and economic/administrative subjects were weighted equally. Food-related subjects include chemistry, physics, biochemistry, food products science, nutritional science, pathology, hygiene and quality. The economic and administrative subject areas include accounting, business economics, logistics, financial management, occupational and leadership psychology, organisation and management, and organisational development.

From 2003 and onwards, the programme was transformed into a three-year course leading to the bachelor degree. In addition to management positions in the field of institutional dietetics in hospitals, nursing homes, prisons, the armed forces and boarding schools, this programme prepares the students for managerial positions within food and catering on off-shore hotel platforms and in restaurant kitchens. Some graduates have found employment in the field of sales and product development in the food sector, and some have taken supplementary courses in pedagogy after completing the study programme in order to qualify to teach in the cookery courses at upper secondary school level.

Completion of upper secondary school was a criterion for admission to the Institutional Catering Management programme in 1995. This meant that one needed to have successfully completed upper secondary courses in subjects such as Norwegian, English, Social Studies, Mathematics and Natural Science. Potential applicants who had only vocational training at the upper secondary level were therefore excluded from the programme. Study plans at the time were grounded on the assumption that all applicants had formal, upper secondary level education. Up until 1994, the number of applicants remained generally stable, and each class comprised some 30 students annually. The prerequisite of completed upper secondary education resulted in a dramatic reduction in the number of applicants as of 1995. In that year, for example, the beginning class numbered only 12 students. This suggested that few of the applicants who might have applied had acquired the prerequisite formal learning. The size of the beginning classes increased somewhat during the first years following 1995.

Akershus University College immediately opened admissions to applicants with non-formal/informal learning when it was permitted again in 2000. Of the 29 students who were admitted, 13 had non-formal/informal learning. These students were somewhat older, on the average, than those with formal learning, but as Table 1 shows, there were also four students more than 30 years old who were admitted on the basis of formal learning.

Table 1:
Age vs. background of students in the Institutional Catering Management programme (Holmesland, Lundin and Risan, 2001)

Background	Age		
	Up to 30 years	Over 30 years	Total
Formal learning	12	4	16
Non-formal/ informal learning	6	7	13
Total	18	11	29

The rationale for adopting non-formal/informal competence as a basis for admission is that competence is not acquired solely through formal education in schools, but also through experiences in working life, family life, associations and clubs, hobbies, and other informal activities. The questions raised are whether such competence is sufficient in order to master a study situation and/or whether the studies are suitably designed for students with informal/non-formal learning background.

In 2000 the Institutional Catering Management programme and the Facility Service Management programme had just completed a self-assessment led by Professor Anne Lise Høstmark Tarrou (Tyldun et al., 2000) from the university college's Centre for Research on Education and Work. The self-assessment resulted in the interest to carry out a systematic follow-up study in order to provide feedback to the teaching staff regarding course content and the teaching plans. The basic idea was to find out how the Competence Reform was implemented and identify issues associated with formal and non-formal/informal learning in higher education. A research group²³ was consequently established in 2000.

²³ The group comprised Içara Holmesland from the Centre for Research on Education and Working Life, Judy Lundin from the Home Economics programme and Hans Risan from the Institutional Catering Management programme. Later the Social Educator educational programme and Nursing programme were established at the university college. The project has been made known in paper presentations at several international, annual conferences. ATEE (Association of Teacher Education in Europe) in Stockholm, August 2001, ATEE i Warsaw, August 2002 and ATEE in Malta, August 2003.

The research group wished to answer the following questions:

- How do students without formal learning master study situations in comparison with students who possess formal learning?
- Do students with non-formal/informal learning encounter any special problems?
- Do students with non-formal/informal learning need specially adapted teaching?
- How do these students fare once their studies are completed?

The project was designed as a follow-up investigation over a three-year period. Students' applications were analysed and placed in two categories according to their background: formal learning students and informal/non-formal learning students. A questionnaire was developed and distributed to all students in autumn 2000 (29 students in all). The answers given in the questionnaire were the basis for topics chosen for the in-depth interview of randomly selected students from the two categories. The interviews were sound-taped and later transcribed. There was keen interest among students to participate in the interviews.

In this article I will discuss the cases of four students with formal learning and four students with informal/non-formal learning who were selected to participate in the follow-up study. The first in-depth interviews were conducted in February 2001. The interviewees were followed up again in May 2001 and in an interview at graduation in June 2002, as well as by a telephone interview one year after the students had completed their studies. The questions concerned how various aspects of the study programme were perceived in terms of its problems and challenges.

In conjunction with the final interview one year after graduation, we also tried to contact the immediate superior of the interviewee in order to find out the requirements that were associated with the type of job the interviewees held. We also distributed a questionnaire to all students of the class in question at the time of graduation and again one year after graduation.

The students' mastery of the study programme during the initial period

The following is a summary of the most important results from the interviews conducted over a three-year period with the eight candidates enrolled in Institutional Catering Management:

Students with non-formal/informal background indicated very early that they were highly motivated to study. It appeared that they had applied for the study based on independent and mature personal considerations. Hav-

ing experienced a few years of working life, they felt they needed additional knowledge in order to further their careers and to accept more challenging work demands. As one student put it:

*I want to work in a hotel or a restaurant and eventually
I want to become a hotel manager.*

For some students, the programme was a part of their occupational rehabilitation after having been classified as physically injured from overexertion caused by carrying out routine kitchen tasks. Several expressed that they were open for job opportunities outside the field of institutional food preparation, for example as a teacher in the area of sales or hotel operations.

Students with formal educational background also indicated that they were motivated to study, but they appeared to be somewhat uncertain in terms of their self-confidence and of what they wanted to gain from the study. Several of the students with formal learning said that they had low self-confidence when they began the study programme. It appeared as if they felt inferior to the students with informal/non-formal learning who had more practical experience, were older and thereby had more life experience. One of them mentioned that he respected occupational experience and felt that he had too little of it.

Students with formal learning stated that they had chosen the study programme based on the advice of parents, colleagues and previous supervisors. In the beginning of the study programme, they thought it was an advantage that they had formal learning background because they had better knowledge in subjects like chemistry and mathematics. These students felt also that during their formal learning they had acquired study techniques and a broader vocabulary than students with informal/non-formal learning, as expressed by two students:

*All students should have formal learning and basic
knowledge of chemistry and accounting when they begin.*

Another student stated:

*I am happy that I have formal learning. It has improved my
vocabulary and made me more self-confident.*

Three of the four interviewees with formal education were considering a management level career in institutional food and catering enterprise. These are the types of positions for which the programme is tailored to prepare students. One of them wanted to start a catering enterprise in collaboration with a friend. It was just depending on the friend's answer for the venture to get off the ground.

From the perspective of students with non-formal/informal training, previous school attendance was marginal and remote. One interviewee, for example, said it had been 15 years since she had gone to school. The interviews suggested that the encounter with student life represented a great challenge for these students. They felt that they started out with little scholastic and occupational competence, and they were apprehensive about how they would handle the change. Some students indicated to lack study techniques for assimilating subject matter and experience in expressing themselves both in written and oral forms. They felt to be weak when participating in professional discussions and also that it was difficult to sit quietly while listening to a lecturer or at a student desk. Foreign words and phrases in books and lectures created problems for some of them. One student put it this way:

*I was anxious when I started. I wondered whether the requirements
were lower for those of us who had non-formal learning. In the
beginning it was quite a transition to come from a job and back
into a study situation. I did not know much about study techniques.
I am unaccustomed to sitting still on a chair.*

Two of the four interviewees indicated that they felt inferior to the students who had formal educational background.

The students' attainments during the study programme

A common experience in both categories was that the students' self confidence improved as they gradually perceived they were being listened to in group work and saw that their obligatory hand-in exercises were approved. They also became more proficient in their oral and written expression. Nonetheless there are grounds to assume that non-formal/informal learning students faced greater pressures to develop themselves as the transition from work to a school situation was more challenging for them than for formal learning students.

Among the interviewees admitted to the programme on the basis of formal learning, confidence about accepting a management position after graduation did not appear to be present to any significant degree. During an interview toward the end of the study programme, one student stated:

*I will accept a job as a cook first, because I don't have experience.
I feel that if I suddenly find myself in a position as kitchen manager
and have to train apprentices, it is important to have experience in
order to be able to answer the questions they ask.*

It did not seem as if the students themselves were concerned with knowing who among them had formal learning and who had non-formal/informal learning. Several of the interviewees indicated they did not actually know to which category the other students belonged. Friendships were made across category boundaries. Students gradually became used to being back in school during the first semester of the programme. The initial phase of the study was characterized mainly by basic, theoretical subjects. As time went by, the students gradually acquired the ability to establish links between theory and practise.

Students from both categories were integrated in group work. Here they gained the opportunity to benefit from the stronger sides of each other and to learn from one another. In more traditional classroom teaching, some of the same applies. My own experience is that students with non-formal/informal learning contribute positively in a classroom situation by offering points of view and personal experiences relative to the topics being discussed. Of course there are exceptions to the rule. One of the candidates with formal learning had the following view of candidates with non-formal training:

They have worked longer in the occupation and have more experience, but it depends on whether or not you use the experience you have. There is a big difference in the class between those who say they have experience and don't use it, and those who have experience and do make use of it.

The candidate emphasised, however, that he did not know who in the class had formal learning and who had non-formal/informal learning.

My impression is that several years of experience from working life and life in general had taught many students with non-formal/informal learning to be conscientious and to practise self-discipline. These qualities are often evidenced by low absenteeism from lectures and in group work. A large portion of the study programme is based on group work. Effective group work requires that the student has learnt to cooperate and to resolve conflicts. Having learnt much from life and from the working environment, students with non-formal/informal learning should have a sound basis in this respect. They also expressed that they felt comfortable doing group work and that it was a useful way of working. On the whole it appeared that students with a non-formal/informal learning background enjoyed the social aspects of student life. Compared with working life, student life offers greater freedom in making acquaintances with others and becoming involved in leisure activities with the class mates. Networking is created, and these networks appeared for most students to endure for one year after graduation despite geographic remoteness.

The interviews showed that non-formal/informal learning provides a solid basis for learning subjects such as organisational psychology, management and special dietetics. One is able to draw on personal experiences from working life and other areas. As one of the students stated:

For this study it has been a great help that I have practical experience, particularly in, for example, subjects like psychology, organisation and management.

It is easier to understand and develop an interest in theories about conflicts in working life if one has had this type of experience. It is more motivating to go more deeply into a course such as special dietetics if one has worked with these kinds of foods previously and has perhaps encountered people who have special nutritional needs.

We expected that students with little academic background in the natural sciences and mathematics would meet their greatest challenges in subjects such as chemistry, biochemistry and business economics. In the interviews students also expressed that they found it necessary to work very hard in order to keep up with content in these disciplines. However, it seemed that students with formal learning also encountered great challenges in these same subject areas. Nonetheless, there were a number of individual differences:

I have had natural sciences during my formal education, and I am very glad I did. I feel sorry for those who haven't had it before.

Despite a difficult point of departure, students with non-formal/informal learning had the same rates of success in these subjects as students with formal learning.

The final examination after two years comprised a six-week exam project and a 48-hour take-home examination.

Table 2:
Relation between grades and the type of background in the 6 weeks project exam (Holmesland, Lundin and Risan, 2002)²⁴

Result of 6 weeks project exam	Institutional Catering Management			
	Formal learning		Non-formal learning	
	n	%	n	%
> 2,5 (Not-honour)	9	67	3	30
< 2,5 (Honour)	3	33	7	70
Total	12	100	10	100

The results in Table 3 show that students with non-formal/informal learning performed decidedly better than the students with formal learning on a six-week examination project. 70% of the non-formal/informal group scored 2.5 or better, as opposed to only 33 % of the formal learning group (See Table 2).

Table 3:
Results of the 48 hours take-home exam (Holmesland, Lundin and Risan, 2002)

Results of the 48 hours take-home exam	Institutional Catering Management			
	Formal learning		Non-formal learning	
	n	%	n	%
> 2,5 (Not-honour)	11	92	9	90
< 2,5 (Honour)	1	8	1	1
Total	12	100	10	100

In contrast to the six-week project exam, the results for the 48-hour take-home examination show no difference between the two categories (Table 3).

Students with non-formal/informal learning performed better than students with formal learning on the exam project, while they performed as well as students with formal learning on the 48-hour take-home examination.

Of the thirty who began the study, seven students dropped out during the programme. Of these seven that dropped out, four of them had formal

²⁴ In 2002 the traditional grading scale of 1 to 4 was in use. (1 is the best mark. 4 is the worst). A grade of 2.5 or lower was considered a good mark (laudable).

learning background and three had non-formal/informal learning (Table 4). All of the eight that I interviewed completed the study programme.

Table 4:
Rates of completion per background and type of type of programme (Holmesland, Lundin and Risan, 2002)

Completion of the program	Institutional Catering Management					
	Formal learning		Non-formal learning		Total	
	n	%	n	%	n	%
Completed	12	80	10	71	22	76
Not-completed	3	20	4	29	7	24
Total	15	100	14	100	29	100

Students' perceptions one year after completion of the study programme

One year after the final examination I again contacted the eight interviewees, this time via telephone. I also spoke with the supervisors for two of the interviewees. The following is a summary of what they did in the previous year and what they planned for the future:

Graduates with non-formal/informal learning background one year after completion of studies:

The graduate had various temporary positions during the previous year. Among other positions, he worked about a half year in a temporary position as kitchen manager at a hospital. He felt he had developed himself during the previous year and had become more mature as a professional. He mentioned also that he had gained greater self-confidence and had become more patient in dealing with his co-workers. Among other things, he said:

The content of the modules I had during the educational program were very useful, and the study programme was important to me.

He received positive feedback concerning his work as a leader. He experienced that he was able to cope well with existing conflicts in the working environment. In the autumn he began to study pedagogy and wished to try his hand at teaching. However, if he did not enjoy teaching, he might wish to return to his job as kitchen manager.

After graduation, the interviewee had returned to her old job as a cook, the same one she held before she started her studies. She therefore felt that she had not needed the additional education to carry out the tasks in her job, but she indicated to have gained more self-assurance and confidence to stand up for her own opinions. At the time of the interview she

was on a long-term sick leave while waiting for an operation on her wrist. She would like to work at the Food Control Authority, or in a position as kitchen manager or cafeteria manager.

This graduate had become a teacher at an upper secondary school. She felt that she had developed herself professionally and personally during the previous year. She mentioned also that she had gained more self-confidence, had learnt to better verbalise «things» and reflect more closely about the material she reads. She encounters many pupils with psychological and social problems in her job and she feels that in different situations it has been important to draw on her non-formal learning as well as on the learning acquired in the psychology and management courses taken during the study programme. As an example, she mentioned that she had presented a paper based on her exam's project at an international conference in Cannes.

The school's headmaster, in a telephone conversation made the following statement about this graduate:

She is a very reliable person who does a good job. I am working to have her to continue here.

After graduation, this interviewee worked a few months as a kitchen manager at a tourist hotel in Western Norway. He was then headhunted to a position as kitchen manager at a hotel in the Hilton chain located near Oslo. In this position he supervised 14 persons and managed a budget of 8 million Norwegian crowns.

This former student stated that he had experienced a soaring personal development during the past year and that he had great ambitions for the future. His dream was to become managing director for a hotel in the corporation chain. He felt that he had advanced in his job as a result of his education.

In a brief interview, the graduate's supervisor mentioned to be extremely satisfied with the kitchen manager, who had
"... definitely made himself noticed in a positive way at the hotel".

Graduates with formal learning background interviewed one year after graduation

- The interviewee was working as a cafeteria manager in a town in the far north of the country and had supervisory responsibility for one to two employees. He was overqualified for the job and he felt that his professional development had been curbed because the job consisted of preparing simple meals. Nevertheless he felt that being at the start

of his career it would be too demanding to bear sole responsibility for operations. He also encountered challenges in terms of personnel management and was concerned about quality maintenance. He considered this job as temporary and wished to move to the southern part of the country, where he comes from. He was uncertain whether he would be comfortable in a managerial position; therefore he might apply for a position as cook.

- The interviewee did not have a managerial position, and she worked as a regular cook in the preparation of various diets. She said that she was learning a lot by working with people from different cultures and with many different types of personalities. She also learnt by observing how her superiors dealt with the management of their subordinates. She intended to hold this position for only a year and was planning to apply later for a job as assistant to the kitchen manager at a smaller place. Eventually she would like to become a kitchen manager.
- This interviewee had studied economics and administration at a university college of finances during the previous year, but he regretted having done this because he felt that he had not learnt very much besides what he already knew from the program in institutional catering management. After completing the one-year course, he would apply for a managerial position in a cafeteria. He said that he was young and lacked work experience. In the long run, he had a strong desire of becoming a kitchen manager either at a nursing home or in a larger institution.
- The interviewee worked as a cafeteria manager in a hospital and supervised two co-workers who alternated their tasks in accordance with an established shift rotation in the hospital kitchen and worked together with her one or two weeks per month. She was responsible for the finances of the cafeteria but not for personnel. She had learnt some leadership skills by supervising two employees and through her dealings with co-workers of different cultural backgrounds. Among other experiences, she had also intervened in conflicts. She did not wish so much to become a kitchen manager because she was uncertain whether such a position would suit her. She would prefer to become a teacher and was planning to attend a teacher training program in the evening.

The results of the follow-up study one year after graduation shows that the graduates with non-formal/informal learning background had, in general, dared to venture into challenging positions. Moreover, in the interviews they stated to have experienced strong personal development during the post-educational year and that they had an optimistic outlook toward the future. I was in contact with the supervisors of two of these graduates, and both commented positively on their co-workers performance.

The candidates with formal learning have cautiously begun working in positions with limited or no leadership responsibility. Although they also stated that they had a professional development during the previous year, they were more careful in their statements. This may be due to the fact that they have chosen positions for which they were overqualified in terms of the education they completed. They stated that they felt unsure and that they needed more experience before they would eventually accept a managerial position in accordance with their education.

Similarities and dissimilarities between the two student groups

Students who were admitted to the Institutional Catering Management programme on the basis of non-formal/informal learning perceived the transition to academic studies more challenging than students with formal learning, especially in subjects such as chemistry, biochemistry and economics. In the beginning of their studies they experienced difficulties in learning theoretical material and in their written expression. The reason was perhaps their lack of practise to doing both. In the interviews, they mentioned that they were unaccustomed to the classroom situation and were not used to expressing their ideas in written form or presenting them orally to a group. A few of the non-formal/informal learning students shared the feeling of being academically inferior to students with formal learning background.

Experience has shown, however, that the initial challenges and problems were experienced only in the transition period. Life experience and work experience provide a basis for understanding and acquiring knowledge in several subjects, as for example in organisational psychology and management. Prior learning through experience also makes it easier to practise self-discipline in the academic situation. Nothing in the investigation suggests, therefore, that students with non-formal/informal learning require a specially adapted programme for learning. The differences between the two categories of students appeared to fade away during the first semester. The examination results showed that students with non-formal/informal learning background to a great extent performed better on the six-week exam project than students with formal learning, while the results of the 48-hour take-home exam were largely equal between the two categories of students.

The survey conducted one year after completion of the study programme, however, reveals a significant difference in how the two groups of students perceive their work situation. Graduates with formal learning seemed to be less confident in their professional skills when first encountering working life. They have accepted relatively less challenging jobs or have decided to go on in further studies. At work, they have accepted less demanding positions that can be considered below what their education has trained them for.

Graduates with non-formal/informal learning background, with one exception, accepted more challenging positions which were more in line with the level of their education. The graduates in this category gave the impression of having «thrived» more than the graduates with formal learning. The graduates with non-formal/informal learning were consistently more positive about the benefits of the study programme than those with formal learning. It appears that life experience and work experience have made a decisive difference in terms of what the students gained from their studies. In other words, they seemed to have a better basis with which to associate theoretical learning. Having this competence, they have ventured into more challenging jobs after graduation and gave indications in the interviews that they were able to meet the challenges of their new position. The ability to master appears to be due to prior the graduates' life and work experiences, which had previously been linked to the theoretical base provided in the study programme. They also expressed to a great extent that they had benefited from their completed education and that they were able to apply the knowledge acquired to the work life.

After having followed up four students with non-formal learning and four students with formal learning over a period of three years, I am left with the clear impression that non-formal/informal learning provides a sufficient basis for completing Institutional Catering Management. The transition from working life to academic life appears to have been difficult, but when the students overcame the initial difficulties it appears that they benefited greatly from their previous life and work experiences in several academic areas. Based on this investigation it does not appear that non-formal/informal learning students require adaptations to fulfill the study programme. From the results, it is inferred that the background of non-formal learning students provide them with the necessary resources for succeeding in the academic programme just as well as students with formal learning. I must, however, make certain reservations since the sample was limited to four students in each category. In addition, the results may be influenced by other factors, for example the difference in ages or personal qualities which are independent of a person's background.

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The Competence Reform in Nursing Education

Kjersti Sortland

Admission to higher education on the basis of non-formal/informal learning is a relatively new experience. In autumn 2000 the Bachelor programme in nursing at Akershus University College admitted the first students with non-formal learning (approximately 40 %) on a part-time study basis. We knew little of the potential consequences, and as supervisor of the part-time study programme in the Department of Nursing, I took the initiative to carry out a study focusing on how students with non-formal/informal learning fared in their nursing studies.

The empirical data presented here is part of a longitudinal study titled "An evaluative study focusing on learning experiences and results of students with non-formal/informal learning and students having formal learning in the Department of Nursing" at AUC. Quantitative and qualitative research methods have been used to collect data about the students' backgrounds and study behaviour.

Education between tradition and the demand for renewal

Nursing education has changed concurrently with changes in society, but patient-related efforts characterised by human compassion and daily care have always remained in the forefront. Great demands are being made to education's ability to meet the modern challenges of a high-tech society with new forms of treatment and rigid priorities in health care. Nursing education intends to maintain the historical and traditional values and, at the same time, meet the demands placed by municipal health authorities and specialist health services on newly trained nurses.

Nursing is an academic discipline and profession that has developed from being a general sector of the medical profession into an independent profession and academic discipline. The nurse's competence comprises a tightly woven network of scientific knowledge, skills and attitudes, therefore the nursing discipline is complex and comprehensive. This competence is acquired through nursing education and is further developed through practise in the profession (Fagplan "Curricular Plan" 2008). The curriculum outlines how the study programme is organised and adapted within the limits established by the general plan.

In the nursing study programme half of the syllabus is allocated to theo-

retical subjects (90 study credits) and half to practical studies (90 study credits). For the full-time programme comprising 110–120 students, theoretical teaching is done mainly in an auditorium setting. The part-time study group has comprised between 30–40 students, and the theoretical subjects are taught in classrooms. During the first year of study, students are closely followed up by teachers. Each class of students is divided into groups consisting of about ten students and has a permanent teacher who provides guidance for group tasks, casework and training in practical procedures and communication at the practicum sites. During this first year the students must pass a practical examination before they begin their practicum. Each practicum period has separate study objectives and various work requirements which must be successfully fulfilled by the students in order to receive a passing grade. In addition to being followed up and counselled during the practicum period by a teacher from the university college, the student is assigned a contact nurse in each practicum period who serves as a daily adviser. Aside from the weekly follow-up by a teacher, the students are taught and evaluated by the contact nurse both halfway through and at the end of the practicum period, which lasts eight weeks.

The focus during the first year of study is basic nursing. The student has tutored practicum lasting 8–10 weeks in a nursing home. The objective of the study is to provide the student with experience concerning what the nursing as a profession entails. As an overall goal, the students shall develop a treatment proficiency that will enable them to provide nursing care based on knowledge while prioritising the patient's perception of the situation. Basic nursing is whatever nursing is called for regardless of the patient's age or state of health. In terms of the nurse's function and tasks performed, emphasis is placed on general nursing skills, care and custodial attention, as well as prevention of complications for bedridden and immobile patients.

Focus during the second year of study is on the nurse's function and tasks in specialist health services. The student has two periods of tutored practicum in respective medical and surgical departments for a total period of 20 weeks. In addition, the student acquires experience in the departments of poly-clinical care, surgery, intensive care, maternity and post-natal wards. The students objective for the second year of study is to learn to assess, plan, perform, evaluate and document nursing procedures for sudden and critically ill patients in every age. In addition the student acquires knowledge and nursing experience in the areas of pre- and post-natal care. In terms of the nurse's function and tasks, emphasis is placed on health-stimulating and preventative tasks, palliative treatment, instruction and guidance for patients and next of kin.

Focus during the third year of study is on the nurse's function and tasks in

municipal health services. The objective for the student is to learn to assess, plan, carry out, evaluate and document nursing procedures for the chronically ill, the physically disabled, patients needing rehabilitation and persons with psychological dysfunctions in all age groups. In addition the student acquires knowledge and nursing experience in the areas of health-stimulating and preventative care. The student has two practicum periods in residential treatment centres, home-based services, various psychiatric wards, public health centres, school health services and rehabilitation units for a total of 20 weeks. In terms of the nurse's function and tasks, emphasis is placed on health-stimulating and preventative tasks, treatment, palliative care, rehabilitating and habilitating care, instruction and guidance for patients and next of kin, and administrative tasks.

Investigation of the students' background and review of academic history

The purpose of the study was to investigate how students admitted to nursing studies on the basis of non-formal/informal learning fared in academic studies as compared with students admitted on the basis of formal learning. Another central focus was on surveying similarities and dissimilarities between students having a non-formal learning background and students with formal learning, both during the study period and after graduation. The study illustrates how the students perceived the study programme generally and on how the newly trained nurse perceived the encounter with practicum.

Since data was collected both from students studying nursing on a full-time basis and from those studying nursing on a part-time basis, focus will be placed in certain contexts on similarities and dissimilarities between the two groups, full-time vs. part-time.

Questionnaires for the students, personal interviews and focus group interviews were used in five phases as shown in Table 1. The interviewees were randomly selected among those who had agreed to be interviewed.

Table 1: Overview of data collection

	Phase	Method	Cohort/Class
Questionnaire 1	After theory studies, prior to practicum in the 1st year of study	Closed answer options on a scale from 1 to 6 with space for open answer options. Space is provided for answers.	2 part-time cohorts and 1 full-time cohort
Questionnaire 2	Completed first practicum period in a nursing home 1st year of study	Closed answer options on a scale from 1 to 7 with space for open answer options. Space is provided for answers.	2 part-time cohorts and 1 full-time cohort
Focus group interview	One part-time cohort towards the end of the 2nd year of study	One focus group comprised 4 students with non-formal learning and one focus group comprised 4 students with formal learning	1 part-time cohort
Interview	At the end of the 2nd year of study	Semi-structured interview with 3 students admitted on the basis of non-formal learning and 2 students admitted on the basis of formal learning	1 full-time cohort
Questionnaire 3	Upon completion of the educational programme	Closed answer options on a scale from 1 to 7 with space for open answer options. Space is provided for answers.	3 part-time cohorts and 1 full-time cohort
Questionnaire 4	Worked for 1 year as a nurse	Closed answer options on a scale from 1 to 7 with space for open answer options. Space is provided for answers.	1 part-time cohort and 1 full-time cohort

The quantitative analysis of the checked-off answers permitted the students to respond on a scale from 1 to 7, where 1 refers to «To a very small extent» or «Very unimportant» and 7 refers to «To a very great extent» or «Extremely important».

The qualitative analysis is an analysis of the interviews and they self-produced responses to the open questions. The open and qualitative answers were transcribed verbatim. The answers were organised in main categories and subcategories that emerged through a numerical summation of the topics mentioned in the questionnaire. Some of the statements and answers given by students will be used to illustrate the findings of this survey.

Results – competence background and student flow

Table 2 displays answer percentages between 66 % and 76 % in the four questionnaires, which is an acceptable sample. The answer percentage can be explained based on study flow-through. Questionnaire 4 was answered one year after graduation, and the answer percentage is therefore somewhat lower, as expected, than for the other questionnaires. The percentage of respondents with non-formal/informal learning varies between 27 % and 36 %.

In this study competence is more important than gender, and since gender factors have no impact, I have chosen not to take into account any gender-based differences. It is, however, interesting to note that the percentage of men with non-formal/informal learning (17 %) is higher for part-time students than for those studying full-time (10 %). One reason for this may be that men have traditionally had greater financial responsibility in the home than women. Nursing studies on a part-time basis entail a greater opportunity to work while studying than is the case when pursuing full-time nursing studies. If it is a goal to recruit more men to nursing studies, it may be advisable to open for more part-time candidates.

Table 2: Answer percentage for the four questionnaires

	Questionnaire 1	Questionnaire 2	Questionnaire 3	Questionnaire 4
Total number of students Number of answers	N = 176 n = 132 = 75 %	N = 176 n = 135 = 76 %	N = 195 n = 145 = 74 %	N = 108 n = 71 = 66 %
Total number of women Number of answers	N = 132 n = 122 = 92 %			N = 71 n = 68 = 96 %
Total number of men Number of answers	N = 132 n = 10 = 8 %			N = 71 n = 3 = 4 %
Formal learning students Number of answers	N = 132 n = 97 = 73 %	N = 135 n = 97 = 72 %	N = 145 n = 100 = 69 %	N = 71 n = 47 = 65 %
Non-formal/informal learning students Number of answers	N = 132 n = 35 = 27 %	N = 135 n = 38 = 28 %	N = 145 n = 45 = 31 %	N = 71 n = 26 = 35 %

The flow of students in this study also reveals differences between the two student groups. Of a total of 286 students, 195 completed (68 %) the study in the prescribed standard time, and 91 students (32 %) terminated their enrolment or postponed completion of their studies for various reasons. In percentage more students admitted on the basis of non-formal learning (80 %) completed their studies than students admitted on the basis of formal competence (61 %). The average mark was low in autumn 2001. Most of the applicants for nursing education in 2001 at Akershus University College were granted admission. Failure on a number of exams, as well as repeated failure, may be the cause for student drop-outs.

Student flow-through patterns may be seen in the light of several factors: students' motivation for the programme, their prior work experience and their perception of real participation during the study, as expressed by one student:

My main impression is that nursing is not really me, that is, I plan to complete the first year in order to get study credits. I will maybe study something else next year. Practicum ruined a lot for me – the nursing home. My goal is to work with children born prematurely. It will take me many more years.

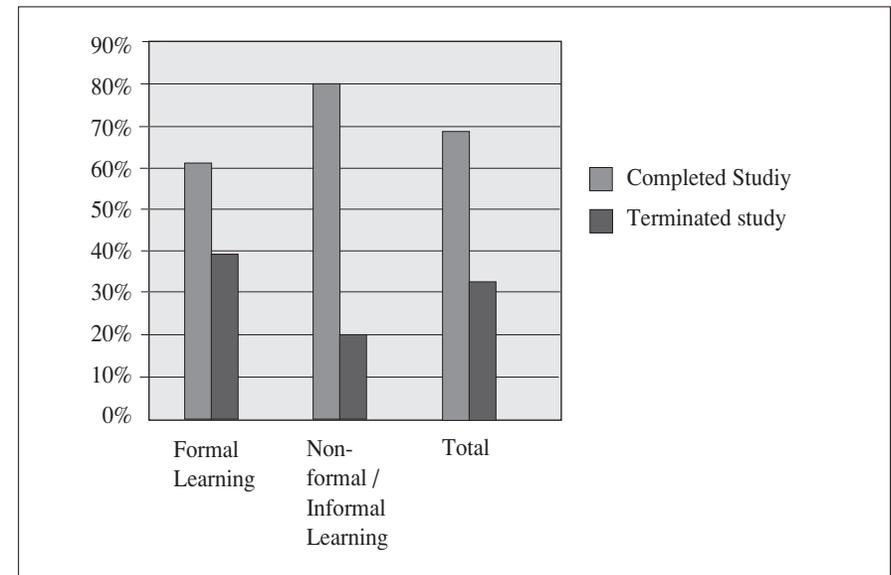


Figure 1: Flow of students. Completed study in prescribed, standard time or terminated/postponed for various reasons

There is a clear tendency, in terms of part-time and full-time study, showing that the percentage of students completing the programme is higher among students with non-formal/informal learning than among students with formal learning. In this context, age may be an important factor since the average age for students with non-formal/informal learning is higher than for students with formal learning. In a total perspective, there are also more students completing the programme part-time than full-time. This may be due to the fact that the average age is higher among part-time students than among full-time students.

In the categories of formal learning and non-formal/informal learning, 38 % of the students (n = 145) have an educational background as auxiliary nurses. Of these, 25 students (45 %) have formal learning and 31 students (55 %) have non-formal/informal learning. The disproportionately higher percentage of students with prior training as auxiliary nurses may be explained by the fact that in this study several part-time classes have a higher average age than those completing their study in prescribed, standard time – a fact entailing in turn that a greater percentage of students have other educational background and prior work experience. In total 26 % are students with formal learning and prior education as auxiliary nurses, and 69 % of the students with non-formal learning have prior education as auxiliary nurses.

The average age, as expected, is higher among students with non-formal learning (age 38) than among students with formal learning (age 31). A

plausible explanation for the wide variation in the average age is the fact that several part-time cohorts were included in this study. A person who is older and has lengthy relevant work experience is far more certain in his/her choice of a profession than a 19-year-old student who has just completed upper secondary school. Some students have tried other professions, and their choice to study nursing has been carefully considered. Several non-formal learning students expressed the following thought:

I have always wanted to become a nurse; non-formal learning gave me the opportunity to do so.

Another student said:

I have a determined goal and my choice is purposeful. I have background experience in the health services.

Relevant work experience may range from having worked as an auxiliary nurse, nurse's aide, nursery school assistant, home care worker, medical secretary, ambulance crew worker, and so forth. As expected, students with non-formal/informal learning have a greater number of years of relevant work experience than students admitted to the programme based on formal learning. One student with non-formal learning expressed it in the following manner:

My work experience has given me security and made me certain about my choice. I am able to link much of the theory to the background experience I have.

My background experience has given me a lot of hooks to "hang" things on.

The opposite was true of students with formal learning. They had more years of «non-relevant» work experience (4 years) than they had years of relevant work experience (3 years). Work experience stemmed from numerous other professions. Businesses, hotels, banks, restaurants, tourism and cleaning were mentioned by many of the students. In terms of non-relevant work experience, there is little difference between the numbers of years for the two student categories. However, there is a great difference in relevant work experience in the two groups; respectively, 14.5 years for the non-formal learners and 3 for those with formal learning. Totally, both student categories have an average of ten years of prior work experience.

The students' motivation for study

The degree of importance a student attaches to becoming a nurse has great impact on the level of motivation during the study programme. Students with non-formal/informal learning tend to state more often than stu-

dents with formal learning that for many years they have wanted to become a nurse:

I have wanted to become a nurse for many years. Non-formal learning gave me the opportunity to do so.

Nursing studies provide the answers to questions I have often asked myself as an auxiliary nurse. I am able to go more deeply into areas where I frequently have felt that I wanted more knowledge. This is exactly what I have wanted to learn.

The results show that students find it extremely important to become nurses, but on a scale from 1–6 the percentage who answered that it is extremely important to become a nurse is somewhat higher among those respondents with non-formal learning (5.8) than among those with formal learning (5.3). Both categories of students consistently regard themselves as well suited to become nurses; however, students with non-formal learning background perceive themselves as somewhat better suited to becoming nurses than students with formal learning. This may be the result of their perception throughout their personal work experience that they are well suited to become nurses. Many of them have their aspirations reinforced by their former place of work and have been encouraged and supported by colleagues when they considered applying for nursing education.

Part-time students find it more important to become nurses than the full-time students. In this respect, age might be a contributing factor. Part-time students are on the average older than full-time students, and a greater percentage of the students have non-formal/informal learning background as well as relevant prior work experience. In addition, a larger percentage of them are already trained auxiliary nurses. Therefore they are familiar with the nursing profession, and when beginning their nursing education as experienced adults, they have carefully considered what they want to do and have made an informed decision. It will necessarily be more important for adults who already have years of life experience to succeed in their chosen profession than it may be for an adolescent just out of upper secondary school. Many of the latter who start their nursing studies immediately after upper secondary school are not yet completely certain that they truly want to become nurses.

The data material used to illustrate the students' motivation is mainly drawn from responses to two questionnaires. Students answered one of the questionnaires at the end of their first year of study; the other was answered at the end of their study programme. Since the questionnaire answered in the initial year of study has a ranking scale of 1–6, whereas the questionnaire answered at the end of the nursing programme has a scale of 1–7, the answers are not entirely comparable.

Both student groups are quite motivated for their study at the beginning of the programme, giving an average score 5.2 (on a scale of 1–7) as shown in Figure 2. At the beginning of their studies, students show little difference in motivation, generally speaking; nevertheless, it may appear that students with non-formal learning background (5.5) are somewhat more motivated at the beginning of the study programme than are those with formal learning (5.12). In general, motivation in both groups tends to decline from the beginning of studies until the first practicum period. It is worth noting that the drop in the curve is most marked for students with formal learning, from 5.1 to 4.1. For students with non-formal/informal learning, motivation also declines (5.5–5), but not as markedly. From a total perspective, students with non-formal/informal learning background demonstrate high and stable motivation for their studies, while motivation is more irregular for students with formal learning background.

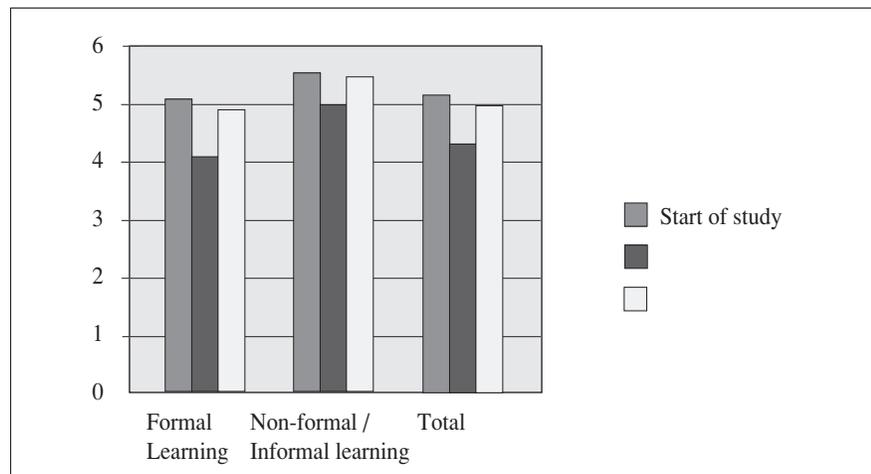


Figure 2: Development of motivation during the initial year of study on a scale from 1–7

Motivation is maintained (5) up to the practicum period for part-time students, and part-time students are consistently more highly motivated for nursing studies than full-time students. On the positive side for both groups, whether they study nursing part-time or full-time and whether they have non-formal/informal (5.4) or formal learning background (4.9), is the fact that motivation increases during the practicum period. Another positive aspect worthy of note is that motivation during the first year of study generally increases for 66 % of students with formal learning and 78 % for students with non-formal/informal learning.

The results show that there is no difference in satisfaction with the practicum period between students with non-formal/informal and those with formal learning. Both groups of students are somewhat more positive to practicum after completing the practicum period than before they

started it. In the first year of study, students with formal learning are somewhat more positive to practicum than are students with non-formal/informal learning. This may be due to the fact that non-formal learning students were familiar with practical work beforehand and thus felt to a lesser degree than formal learning students that they had learnt something new during the practicum period.

Students were also asked to rank on a scale from 1–7 their motivation for all practicum periods during the study programme. The results show that motivation fluctuates, but it is at its absolute lowest during the first practicum period. It rises during the second year of study during the practicum periods spent on the medical and surgical wards, and then it declines slightly during the practicum period in the nursing home. However, it rises again during the practicum period in psychiatry and the end of the study programme. One year after graduation from the programme, motivation is higher than it was at the end of the programme. Based on these results there is no clear difference between students with non-formal/informal learning and those with formal learning, nor between students who study part-time or full-time. As the results show in Figure 3, the tendency is nonetheless that motivation in students with non-formal/informal learning is consistently highest.

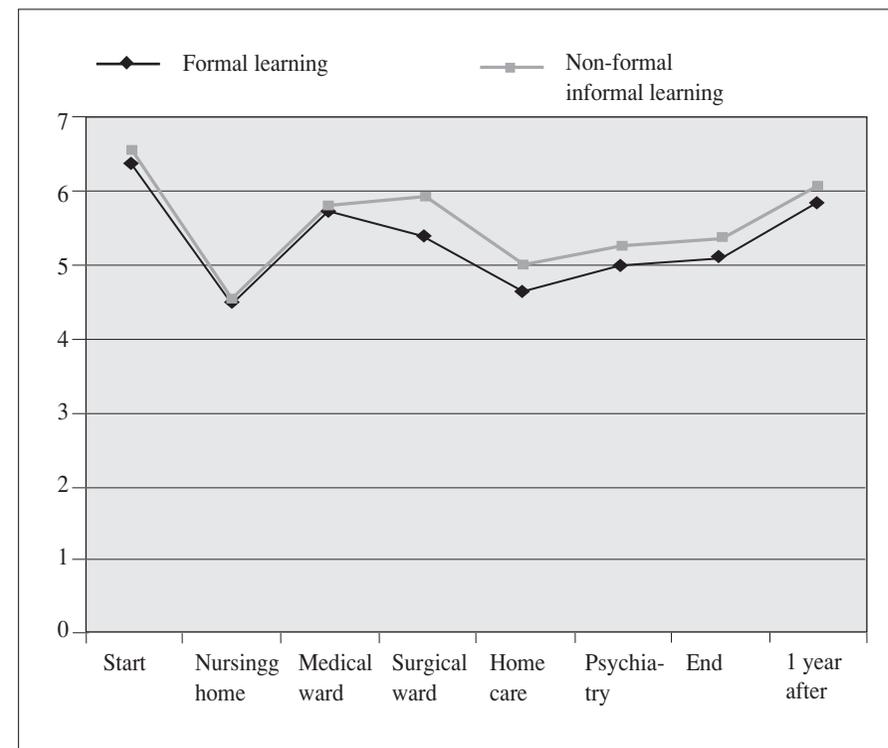


Figure 3: Development of motivation during the course of nursing studies and one year after graduation from the study programme

What happens with students between the start of their studies and the practicum period in the initial year? Do students know enough about the nursing programme before they begin their nursing studies? What can be done, particularly during the initial year of study, in order to increase nursing students' motivation? These are important issues to address and remedy with appropriate measures, since it is a fact that more than one in five students leaves higher education a year after having begun. Slightly more than 85 % of all nursing students remain in the same educational programme one year after they began their studies (Hovhaugen & Aamodt 2006).

Based on the results presented here, it may be wise to implement special measures aimed at students with formal learning background. At the same time it is also important to give serious consideration to the experiences of students with non-formal learning and to take into account the needs of the individual student when the study programme and syllabuses are planned. By providing students with non-formal/informal learning the opportunity to study nursing on an equal basis with students who have certificates of formal learning may in itself be a motivating factor that could overshadow some of the other factors affecting motivation. In the light of some of the statements made by students, one might be inclined to wonder whether the Bachelor programme in nursing is primarily designed for candidates who are already auxiliary nurses and have the relevant work experience. The University College definitely has room for improvement in terms of designing the study programme to answer the needs of students who come directly out of upper secondary school and do not have relevant work experience.

The results show that both student groups, when looking back in retrospect at their nursing training, feel that they were more motivated at the end of their studies than they actually indicated in their responses on the questionnaire at the end of the study programme. During the first year as a nurse, motivation fluctuates for both groups. It declines somewhat during the first year as a nurse, and then it begins to rise again during the same year. In a total perspective, motivation as measured in all the surveys, both among students and trained nurses, is highest for respondents with non-formal/informal learning.

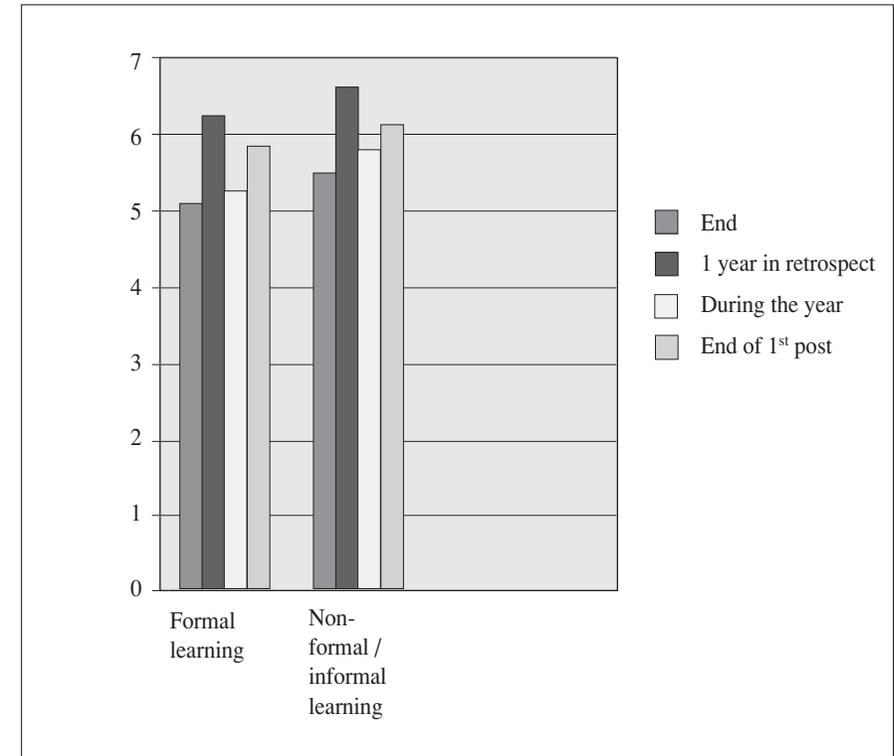


Figure 4: Motivation fluctuates in both groups

Competence background and study benefit

The following presents the students' own evaluation of the study programme focusing on the degree of difficulty of the curriculum literature, on the timetable for classes, on several pedagogical methods, the learning environment in the class and personal effort (The data are collected from questionnaires 1, 3 and 4, see Table 1).

In answer to the question of whether there are subjects or topics to which more teaching time should be devoted, 50 % of the students answered that more teaching should be devoted to natural science subjects such as anatomy, physiology, pathology, pharmacology and calculation of medication. Students want more practical training in nursing procedures in the nursing curriculum. As expected and as shown in Figure 5, the need for more scheduled teaching in the practicum sites is greater among students with formal learning background.

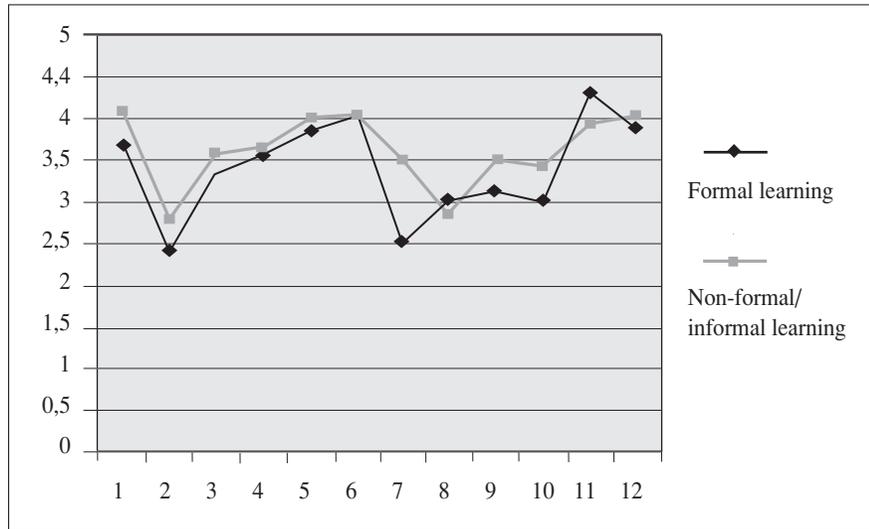


Figure 5: The students' perception of whether sufficient scheduled teaching is given in the various subject areas (1 = Strongly disagree, 5 = Strongly agree)

1 = Basic nursing	2 = Anatomy and physiology	3 = Psychiatric nursing
4 = Home nursing	5 = Communication	6 = Theory of nursing
7 = Practicum site	8 = Calculation of medication	9 = Anatomy and physiology
10 = Pathology	11 = Social studies	12 = Psychology

During the course of the study programme students are most satisfied with teaching at the practicum site (7) and would like more of it. This applies to all students, regardless of whether they have non-formal learning, formal learning or are full-time or part-time students. The practicum site is a safe area in which to practise skills that must be mastered when the nurse begins practicing the profession:

A lot of fun and incredibly instructive. A wonderful change after many hours in the classroom, and a great way to become acquainted with other students. Good teachers who were good at imparting knowledge. They enabled us to master nursing procedures in a secure and professional manner.

Several students pointed out that the teaching of medication calculation could be made more realistic by placing some of the teaching of this subject to the practicum site.

One year after graduation and after working for a year as a nurse, the graduates are able to look back on their studies in retrospect. They were asked to evaluate the weighting of the various components in the study programme. As we will recall, the students during their studies were quite

equivocal in their contention that there was too little scheduled teaching in subjects such as anatomy, physiology, pathology, pharmacology, medication calculation and practical procedures at the practicum site. After having worked as nurses for one year, the students do not answer categorically, but it is the general consensus that pathology, pharmacology, anatomy and physiology are subject areas in which it is extremely important to have solid knowledge:

Anatomy and physiology, pathology and medication calculation are very basic in order to be able to practise nursing.

This is entirely in line with the findings in a study concerning what newly trained nurses thought should be emphasised more during their nursing education (Alvsvåg and Førland 2005). Both groups agree that too little scheduled class time is set aside for teaching nursing of acute and critically ill patients:

We should have more training in nursing for the acute and critically ill; this is the area where it is literally a question of life and death.

Nurses with a background of non-formal/informal learning think that there was sufficient training in practical procedures at the practicum site, while nurses with formal learning find that the programme should offer additional hours of teaching at the practicum site:

[There] was too much about nursing theoreticians during the first year of study.

Too much about theoreticians. There should have been more about nursing of the acute and critically ill, more time and drills on procedures at the practicum site.

If we had more teaching about pathology it would have been easier to know how to provide nursing for these particular patients.

The volume of the curriculum literature is consistently assessed by both categories of students as being adequate. The students are also in relative agreement about which subjects are difficult and which ones are less difficult. In a total perspective, there is practically no difference between their separate assessments of the difficulty of the curriculum. Students with formal learning background found nursing and sociology more difficult than did the students with non-formal/informal learning, however they perceived microbiology significantly easier than students with non-formal/informal learning. Somewhat surprisingly, psychology in the initial year of study was assessed by both groups as the most difficult subject.

One explanation for this may be that students in the early stages of training find it difficult to relate the subject of psychology to nursing science. The very fact that one does not quite see the value of a subject might, perhaps, entail negative consequences in terms of motivation and the ability to learn the subject matter.

The students found anatomy, physiology, pathology and sociology more difficult than general nursing subjects. This is in contrast to the marks that students achieve in psychology and nursing respectively (see the section on how students perform on examinations). Both groups pointed out in particular that anatomy and physiology are difficult, with many foreign words and phrases to be learnt and too few hours allocated in proportion to the curriculum:

There are too many foreign terms, making it difficult to understand the context.

Financial resources for the university college and for the nursing programme have been significantly reduced during recent years. With fewer teaching positions in the Bachelor programme and a reduction in the number of scheduled teaching hours, portions of the curriculum are now offered in the form of self-study.

In terms of the students' preferences concerning teaching methods, it appears that some students want more of a mix and feel there is too little variation of methods. A very small percentage of the students say that there is not too much of any one method, but there is a modest tendency in favour of lectures combined with an opportunity to discuss issues and do exercises at the practicum post. Thus, according to the students, these are the teaching methods most suitable to learning.

In a total perspective, 65 % of the students indicated that the number of lectures was suitable. Students with non-formal/informal learning expressed a slighter tendency to have more lectures and classroom teaching combined with discussions than students with formal learning:

I really enjoy myself at school. I feel the pieces of the puzzle fall into place after following the lectures.

Classroom lectures are best in the long run. I learn more from classroom lectures.

Students also felt that they learnt a lot from subject-related discussions in class. The varied experiences of fellow classmates were perceived as providing additional input and making the discussions informative. However, some students expressed the view that opening the classroom for too

much discussion could be negative. Two students expressed these perceptions by saying:

Some people talk too much. One should not get the impression that it is necessary to have worked as an auxiliary nurse for many years in order to become a nurse. The rest of the class does not always find it interesting to hear about other people's experiences.

I don't think it is advantageous that some students have no experience at all and others are auxiliary nurses with a lot of work experience. The ones with experience take the liberty to interrupt the lecturers, and whatever opinions the rest of us have is looked upon as naïve.

It seems that students with non-formal learning expect that the school should place even more emphasis on lectures as a teaching method. Is this because lectures represent the teaching form to which "adults" are most accustomed? When they attended school, group and project work was not as common as it is today. Another interpretation of the statements made by students with non-formal learning is that they have been working for several years and, therefore, are accustomed to making contributions. However, when they return to the classroom they might be more eager to listen and "receptive" to lectures. Younger students who have just graduated from upper secondary school are often familiar with teaching methods such as group work and projects. This study also reveals that younger students tend to assess group work more positively than do the "adult" students.

More than half of the students think that the programme had a sufficient amount of group work. It was pointed out that the academic subject and the composition of the group were important factors. The following quotations express the students' perceptions of group work.

When forming groups, consideration should be given to those students with lots of experience, and groups should be set up as homogeneously as possible. Personally I am in a group with complete "novices" who have never worked in the health sector.

The group does not function well at all. I get very little subject-related input.

Our group functions very well. It's a good environment and this method of learning makes one think a little harder, and additional viewpoints are raised other than one's own.

Very educational, interesting and opens for discussions.

For some students it is easier to talk in smaller groups. Not everyone is comfortable speaking up in an auditorium filled with more than a hundred students. The use of several different teaching methods is useful, depending on the subject to be learnt. Some students pointed out that group work had a tendency to meander, although it was a good method when discussing difficult topics. Students had different opinions on whether topics were more deeply explored during lectures than is possible in group work. By using lecture method the students does not need to find out things on one's own; the student may simply ask. Group work is more often a form of learning where the students seek solutions themselves. It is stressed that the burden of responsibility in group work is on the students themselves. Group work is a collective responsibility; if not every member of the group take this responsibility and come prepared to contribute, the quality of the results suffers.

The students were also satisfied with being in permanent groups over time. This was considered especially important for full-time students in very large classes.

In permanent groups over time, we can discuss essential aspects of the study programme; this is very good.

It was pointed out by several students that not everyone comes prepared to group meetings, and that this was negative. When a group functions well, group work is consistently evaluated as a positive learning method:

Our group functions very well, [it's] a good environment and this method of learning makes one think a little harder, and additional viewpoints are in addition to one's own.

I would like more group work in the form of specific tasks to be accomplished. One learns more from this than from lectures alone, I think.

The students found that there was little variation in teaching methods, but since each teacher used his/her own personal techniques, the methods were varied in a global perspective. Most teachers used a good mix of videos, PowerPoint presentations, projectors, overheads and whiteboards. When a teacher stands beside an overhead and lectures for three hours, motivation will decline. One part-time student pointed out that when a student has classes only two days a week, the need for variation is not very great. A large number of students in both categories claimed that the best learning environment was characterised by coming prepared to smaller classes with enthusiastic teachers, where there is an orderly atmosphere but still room for questions and discussions relevant to the subject.

Although the students found little variation in the teaching methods, this study shows that the university college's priority of organised classroom activity is assessed as being suitable. Assessment of the academic programme and time for discussion and reflection are the areas in which there was a clear division of opinion among students. A total of 47 % of the students answered that too little time was set aside for discussion and reflection. 51 % of the students answered that too little time was set aside for assessment of the academic programme.

An important question is to what degree the programme succeeds in making learning and the curriculum interesting for the students. Is the programme best suitable to those who have prior work experience in the health sector? The age of students in any given class may vary from 19 years old to well over 50. Clearly, learning aptitudes will vary on the basis of both age and prior experience. There was a great difference between students who come directly from upper secondary school and those who have worked as auxiliary nurses for many years:

I am not very committed; I came right out of upper secondary and feel that I had to mature during the course of one summer holiday. [I] feel that the programme is designed for adults.

It doesn't say in the criteria for admission that one has to have worked as an auxiliary nurse for many years, but it certainly seems like that.

There should be more room for development from the level one is at. [It is] boring to learn things already known, for example making up beds, attending to bedridden patients and so forth. A waste of time.

On a scale of 1–6, students with non-formal learning background (4.7) indicated to a greater extent than students with formal learning (4.0) that the programme was adapted to their preconditions for learning. In addition, students with non-formal learning were those most satisfied with the way teachers impart subject-related knowledge and made the subject interesting (non-formal 4.4 and formal 3.7), and with the way they related the field of nursing to the subject taught (non-formal 4.5 and formal 4.0). It appears that the university college «appeals» more to students with non-formal/informal learning than students with formal learning. Could it be that the university colleges are less successful at adapting the nursing programme for those who come directly from upper secondary school? Does an indication of the answer to this question lie in the knowledge that many students with formal learning background fail to complete the study programme? Do the younger students have a somewhat distorted view of reality in terms of what nursing practise and the nursing profession entails?

There was almost no difference between the two categories of students in terms of the degree of importance that the various core subjects have on their development of nursing competence. It is interesting, however, to note that both categories of students think that the natural science subjects are most significant for their development of nursing competence. This is in line with the students' desire for more teaching in the natural science subjects, in addition to more teaching at the practicum sites. Both student groups expressed just as markedly that psychology, and particularly social studies, are the subjects that have least impact on their development of nursing competence.

At the end of their studies, the students were asked how many hours they spend on average per week reading the syllabus literature and relevant materials during both the theory and practicum periods. The results show that students with non-formal/informal learning, in both theoretical subjects and in the practicum period, spent more hours per week reading than did the students with formal learning. The majority of students with non-formal learning read between 10 to 20 hours per week in the theory period, i.e. an average of 2.5 hours per day, while almost half of the students with formal learning read 10 hours or less per week, i.e. approximately 1.25 hours per day. It can be concluded that students with non-formal learning background spent twice as many hours per day reading than did students with formal learning (Sortland 2007). One student with non-formal learning said:

I understand better and more easily during lectures, and the the reading becomes more interesting.

In the area of practical studies, the study showed that students read on average far less per week than they did in the theory period, regardless of whether they were enrolled in the nursing programme on a part-time or full-time basis and whether they had formal or non-formal learning background. In a total perspective, students with non-formal/informal learning read on average more during the practicum period than students with formal learning. It is an established fact that students are fatigued at the end of the workday in the practicum period. Students state categorically that the first weeks in a new practicum site are very exhausting and they do not have any energy left to read. One of the reasons why students with non-formal learning read more during the practicum period than did students with formal learning may be that non-formal learners have prior experience with practical routines and are therefore not as fatigued after a day of practicum. Their prior practical experience supplants the need to adapt to the demands of practicum, which for many others can be exhausting. This in turn results in surplus energy that can be applied to reading when they come home at the end of the workday. Another reason may be that they already «master» the practical tasks and perhaps seize the opportunity to link theory with practise.

Both categories of students think that too little time was set aside for reading while they were in practise, i.e. that they wished to use one part of the workday to assimilate theory that is relevant to the particular learning situations they experience in practise. This concern is a recurrent topic of discussion in coordinating meetings and other meetings with the students and contact nurses. There is absolute consensus that it is important for students to read relevant literature while in practicum. There are reservations, however, concerning whether students should be allowed to withdraw and read during the workday or wait until the end of the workday.

Experiences gained by students during practicum

Students with non-formal learning background perceived to a greater extent than students with formal learning that they were prepared for practicum. Students with non-formal learning were more satisfied with the information they received prior to the practicum period. On the other hand, students with non-formal learning (4.8) and students with auxiliary nursing experience responded that they spent more time adjusting to the role of student than did candidates with formal learning background (3.4):

[I] spent four weeks to begin thinking of myself as a nursing student; [I] have ten years' prior experience as an auxiliary nurse.

I'm having trouble adjusting to the role of student..... I have a much greater potential than I am given credit for. I am very careful about staying within my competence area as a student, but good grief – show a little more confidence in me, let me try more on my own.

Now I am suddenly a student and I don't dare try to do what I am actually capable of doing.

Somewhat surprisingly perhaps, the study showed that students with non-formal learning, on a scale of 1–7, indicated to a greater degree (5.6) than students with formal learning (4.9) that they were given the opportunity to be students in practise. This awareness of being a student was greater among part-time candidates than among full-time candidates. Far more than half of the students with non-formal learning background had prior training as auxiliary nurses and were used to practical work. For these individuals it may be difficult to assume the role of student in a familiar environment with routine tasks they are accustomed to take the initiative to perform on their own:

[It is] easy to slip back into one's "old" role of auxiliary nurse.

[I am] used to working; it is difficult to readjust.

The fact that students with non-formal, practise-related learning are given the opportunity to spend more time with patients may be one of the reasons why they perceive to a certain degree that they are given the opportunity to be students. For a large number of the students with formal learning, the student role in practise is perhaps more unfamiliar, and they consider tasks like physical care of patients as more "work" than study.

There was no difference between the two categories of students in terms of the transition from the role of student to practising nurse. Both groups perceived that the role of practising nurse role was challenging:

I think the role of student was demanding. I had to be on my toes all the time, but it was also a luxury to be in a learning situation.

As expected, students with formal learning background feel that they need more weeks in practise than students with non-formal learning feel they need. The greater number of students with non-formal learning had relevant prior experience, and it is therefore not unexpected that they felt that they could draw on prior practical experience to a greater extent than the students with formal learning expressed. Having prior practical experience and finding early in the programme that they already master practical tasks, may be reasons why students with non-formal learning background ranked their learning benefits somewhat lower than did students with formal learning. Students with formal learning responded to a much greater extent than those with non-formal learning that they learnt something new in the practical phase, and that practicum presented challenges that were commensurate with their learning background. Those who had prior experience as auxiliary nurses responded that they had learnt little that was new during the first-year practicum period, and what they had taught could have been covered in less time:

[I] hope that I will learn something new and that my time in practise can be adjusted so that I don't have to spend a lot of time on things I already know to do well.

I think the university college should assess the individual student to determine what is necessary during practicum. Many of us have lots of experience and would rather have theory instead.

More than half of the students, both those with formal learning and those with non-formal learning, responded that a period of between 4 and 8 weeks is needed during the first-year of nursing study. The majority of the students with formal learning responded that they needed 7–8 weeks, while those with non-formal learning background answered that they needed 5–6 weeks of practicum during the first year of study. A large number of the students who were trained auxiliary nurses with many

years of experience in either the municipal health sector or nursing homes responded that 4-5 weeks of practicum would have sufficed:

I am absolutely satisfied with the practicum site, the contact nurse and adviser. It is just that it seems a little meaningless and frustrating to be evaluated on skills and work tasks that I have already performed on my own for ten years.

At the same time, a large number of students responded that they learn most while in practicum, since theory and practise go hand in hand. The fact that learning occurs on the threshold between theory and practise should be taken into account when organising future nursing programmes.

It is important that students are offered practicum sites with real learning situations for those who have prior experience as auxiliary nurses. The university college should be more flexible and offer greater freedom of choice, co-determination and individualised plans when students have lengthy practical experience. For many students with non-formal learning, eight weeks can be a very long time, particularly if they are not followed up and are left to perform assigned tasks on their own. Several respondents answered that the programme should take into account prior training and allow the experienced auxiliary nurses to complete practicum and be evaluated in a shorter time:

The university college has never asked me about the knowledge I already have, and I feel that I am being treated according to a universal standard.

Students with formal learning background who do not have prior practical experience will acquire learning benefits regardless of the department in which they are placed during the first year of study. If they come directly from upper secondary school without any prior work experience, whether relevant or irrelevant, the challenges may be insurmountable for those who are placed during the first year in a department with patients having complex diagnoses or where the pace of work is hectic.

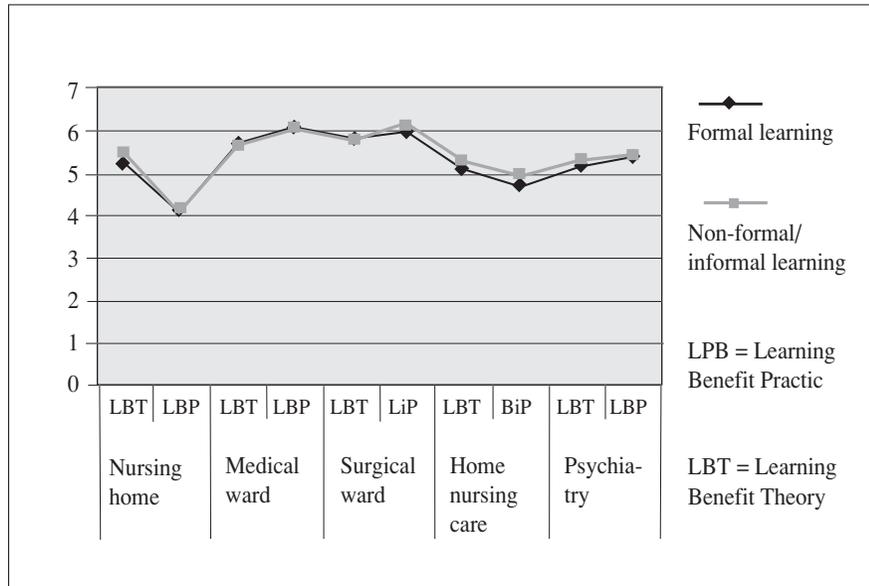


Figure 6: Learning benefits in theory and practise

It emerges clearly in Figure 6 that both categories of students perceived that learning benefits were not as high during the first year of study as they were, for example, in the second year of study in medical and surgical practicum. On the other hand, both groups evaluated learning benefits from theoretical subjects as equal during the first and second years of study. As seen in Figure 6, there was practically no difference between the student groups throughout the entire academic programme.

Regardless of whether they have non-formal learning background and prior training as auxiliary nurses or formal learning background, it is important that all students feel challenged during practicum. On a scale of 1–7 during the initial year of study, students with non-formal learning responded to a lesser degree (4.6) than students with formal learning (5.2) that they were challenged during practicum. Students with non-formal learning background (4.8) also responded to a lesser degree than students with formal learning (5.4) that they learnt something new during practicum in the first year of study:

Those of us who were admitted on the basis of non-formal learning and have worked so many years have a good deal more experience in terms of working with people. I would prefer that the university college placed more emphasis on individual study plans where they take into account what the student knows already and try to design an individual course of study that builds further on what the student already has achieved. At times things are repeated over and over again ad nauseam.

Students with formal learning who had absolutely no prior experience felt that a period of ten weeks of practicum was necessary:

I have no prior experience, and that means that I need some time to learn what has to be learnt.

The students seem to indicate that learning truly takes place during practicum. During practicum, the theoretical material falls into place:

Practicum is very educational. This is where I learn most. The pieces of the puzzle fall into place in relation to theory.

[I] was able to experience some of the theory we have had; theory is more quickly understood in practise.

Hands-on practise, first-hand experience and relating nursing studies to the encounter with patients are the methods that are seen as most conducive to learning. Becoming a good nurse is inextricably linked with experience and practise. Relating theory to practise and practical experience to theory appears to be meaningful to the students.

Many of the students expressed the desire for more teaching of theory, meaning knowledge acquisition without too much personal participation. At the same time, they said that they learnt more by participating in practise. This may appear to be a contradiction but is very likely based on the fact that the students' prior schooling has been predicated on a very prevalent theory-related cognitive tradition. Likewise, the students are tested and are given exams requiring them to be able to repeat factual information.

Early in their studies students with formal learning experienced to a greater extent than students with non-formal/informal learning that not enough time was set aside to study relevant theory while they were in practicum. This situation changed towards the end of the programme. Both groups then indicated that extremely little time was set aside during the programme to permit them to study primary and ancillary studies while they were in practicum. A total of 70 percent of the students responded that far too little time was allocated for studying relevant theory during practicum.

This difference in the beginning of the programme, which is practically identical to ratings after graduation, may be explained by the fact that students with non-formal/informal learning generally had lengthy practical experience and perhaps did not experience the same need to study theory while they were in practicum as did students with formal learning. It is possible that in the beginning of the programme it was unusual for non-formal/informal learning students to set time aside to read theory while in the practicum

It appears that as students with non-formal learning gradually adapted to the role of student, they developed a greater need for time allocated during practicum for studying relevant theory. Relevant work experience entails that much of the necessary practical expertise is already “routine”, but that theory is not yet mastered to the same degree. Prior experience enables the students to draw parallels to similar practical situations. The student has a visual image and concept from prior experience. Therefore it is unnecessary to be in the actual situation in order to study relevant theory.

In general, since students are unable to study much during practicum, it would be very beneficial if both the practicum site and the school would make it permissible for students to withdraw and study relevant theory-related material during “working hours”. Students frequently say that they find it difficult to withdraw and study if there is much to be done on the ward:

Are you just sitting here reading? Do you really have time for that?

If the quality of the nursing programme is to be improved, much can be done during the time the students are in practicum. Today 50 % of the programme is practicum. Both the university college and the practicum sites are concerned about the percentage that practicum represents in the total programme. It is high time for the university college and the practicum sites to collaborate more in order to improve the quality of the practicum weeks. One way of doing this is to provide closer guidance for students while they are in practicum. Do all students have to do the same thing inasmuch as the learning situations vary from department to department? Occasionally students spend an inordinate amount of time trying to solve “academic” problems in practise. Shouldn’t the learning situations during practicum be more carefully directed than they are today? Rather than expending teacher resources on ensuring that everyone does things in the same way, shouldn’t some of the time be devoted to developing individualised plans in consultation with the students?

From many quarters, particularly from nurses in practise, it is claimed that the nursing profession is a practical vocation. The emphasis on practise has centred attention on the degree of proficiency with which newly trained nurses have mastered nursing procedures and how well nursing studies have prepared the nurses for their chosen profession.

Both students with non-formal learning and formal learning responded that they had mastered practical tasks to a greater degree than theoretical tasks while they were in practicum, but as expected, students with non-formal learning claimed a somewhat greater mastery of practical tasks than did students with formal learning, and vice versa:

I think we should have had more teaching and guidance about how to write assignments. Many of us have never written a formal paper before.

For students with non-formal learning background, the difference was more pronounced during the first year of study than after graduation. This difference was not as great among students with formal learning. In sum, students with non-formal learning background developed during the programme a greater mastery in terms of theoretical tasks than did students with formal learning background. Age was an important factor in both categories of students. The longer it had been since the candidate attended formal school, the longer it took them to be adapted to the role of student:

I’m having problems with study techniques. With so much material it is difficult to see what is most important. I enjoy being a student and look forward to each new day at school.

Several studies have been conducted involving newly trained nurses (Fagermoen 1994, Havn 1997, Andresen 2001, Alvsvåg and Førland 2005) showing that there is a gap between the expectations of the practicum site and the newly trained nurses’ actual competence. Other studies (Benner 1984, Thomka 2001 and Ellerton 2003) show that the newly trained nurses focus on procedure per se and lack the ability to communicate with patients. The students (Sortland 2007) perceived that they were relatively secure in their performance of nursing procedures. The results I found show that on a scale of 1–7 students with non-formal/informal learning (5.3) were somewhat more secure in their performance of nursing procedures than students with formal learning felt they were (4.8). It also emerged very clearly that when the procedure was more advanced, the students felt more insecure in carrying out the task. Veneflon insertions, urinary catheter insertions and embedding of stomach tubes are the procedures that students most frequently answered they felt insecure to perform. Two-thirds of the students answered that they felt insecure to execute the most common procedures performed daily in hospitals, nursing homes and in home nursing care.

One year after graduation from the nursing programme, nurses with non-formal learning background still felt somewhat more secure in the performance of nursing procedures than did nurses with formal learning. The tendency was that nurses with non-formal learning also felt that they work more independently and that they mastered their chosen profession to a somewhat greater degree.

The empirical data also shows that students consistently gave feedback regarding their wish for more teaching in nursing procedures as well as practical training in the practicum sites. Students did have the opportunity

to practise on their own at the practicum sites, but experience has shown that the large majority does not make use of this opportunity. Giving injections and inserting veneflon catheters are among the procedures students cannot practise without a teacher present. If students are to be better trained in practical procedures, the university college must adopt better measures than exist today in order to facilitate training.

How do the students fare on the examinations?

More than half of the students in both categories answered that both the take-home exam and the school examination were very important in the learning process. The tendency was that students with non-formal learning background indicated to a greater extent than students with formal learning that the examination was generally important in the learning process. One explanation for non-formal learning students' perception of the take-home exam, as somewhat more important in the learning process than the school exam, may be that they perceived the writing process as an important component in learning.

Based on the empirical data, there is no difference between the two groups in terms of whether one examination form is more important than the other in the learning process. One student commented more fully on his perception of the examination:

The exam itself is not what is most important. It is an understanding of the whole that is most important. The examination confirms that I have learnt and achieved an understanding.

One student answered that the school exam had very little importance for learning, by stating the following:

The exam is a total waste of time. The exam measures only my ability to reproduce the syllabus, not my understanding of it.

One student who responded that, for him, the school exam was most important for learning, clarified:

The learning process should precede the exam, not come during the exam.

From a pedagogical perspective, the ideal is that learning is a continual process and occurs before, during and after the examination.

One year after graduation from the programme, both categories of students thought that the school exam was necessary to a greater degree than the take-home exam, as a stimulus to learn the subject matter continually.

In this respect, the take-home exam meant less for students with non-formal learning background than for students with formal learning. Both categories of students expressed that the form of the examination has an impact on the amount of work done during the study programme:

For me the important thing about the school exam was that it meant intensive attention to the material and structured studying.

I think examinations are brilliant, and I enjoy getting a reward for my effort.

The students were also asked what significance the individual exams had in the development of their nursing competence. As seen in Figure 7, there was practically no difference in the responses given by the two categories of students. As unequivocally as they scored exams in pathology, anatomy and physiology highest, they scored social studies lowest.

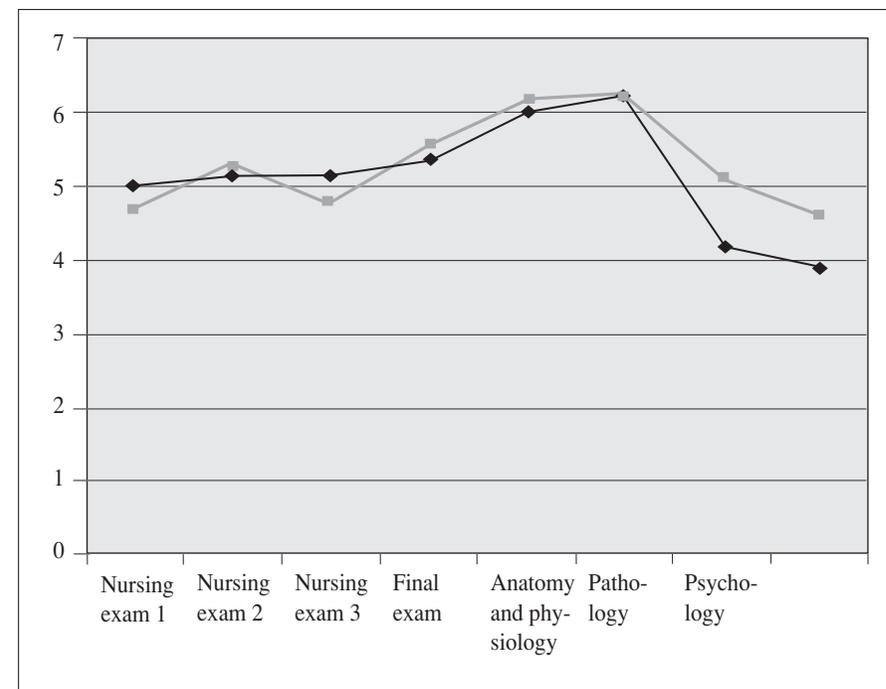


Figure 7: Significance of the examination for development of nursing competence, rated on a scale of 1–7

The main tendency was that performance on the exams for both students with non-formal learning and formal learning resulted in an average mark of C, and there was no pronounced difference in the average mark between the two student groups. In anatomy, physiology, pathology, psychology and general nursing exam 1, the average mark is the same (C). The exam result in sociology was the most distinctive average mark. In

this subject students with formal learning (B) achieved an average mark two marks higher than students with non-formal learning (D). There may be several reasons why students with non-formal learning background achieved poorer marks in social studies than students with formal learning. One reason may be that social studies is a consecutive course in upper secondary school and is thereby more strongly reinforced in students with formal learning than in students with a non-formal learning background. The result may also derive from the fact that students with non-formal learning consider social studies as the subject that is least relevant to the field of nursing studies. Thus social studies were not as highly regarded as for example a subject like pathology. For some students, the subject may be relatively unfamiliar. A well answered examination in social studies demands argumentation and discussion of relevant theory. For many of the students with non-formal learning background, this was precisely the type of ability in which they had little prior training and in turn perceived as more difficult, in contrast to students with formal learning.

Both the general nursing exam 2 and the final examination were take-home exams in which students discuss nursing issues in the light of relevant theory and practise. The tendency for both of these exams was that students with non-formal learning achieved on the average somewhat lower average marks than students with formal learning. Students with non-formal learning perceived the take-home exam as more important in the learning process and in the development of nursing competence than the school exam. One explanation may be that the student groups had unequal training background in reasoning and argumentation in written exercises. For the take-home exam it was expected that the student would apply knowledge from several disciplines. By working with nursing issues over time, the students normally find that they have a need for knowledge from several different disciplines, and that the sum of these forms a composite understanding. With this type of exam, the students are given an opportunity to immerse themselves in nursing issues and relevant theory, while at the same time they get training in academic writing. Therefore, students with non-formal learning background perceived that they learnt more than did students with formal learning.

The results of the final examination in general nursing, where students expound upon a nursing issue over time, revealed no differences between the two student groups. Both groups achieved an average mark of B. This showed that although students with non-formal learning had struggled with academic writing in the course of the programme, they did finally master it on a par with formal learning students at the end of the study programme.

The results from exams taken at the school were consistently better among part-time than they were among full-time students. This is particularly

evident in pathology, which is a fact-based subject. The occurrence may be coincidental, but it can be explained by the fact that the part-time classes are small (30–40 students) in comparison to the full-time classes (approx. 100 students). Class size can have a great impact on the learning environment. This observation is repeated frequently by the students in their comments concerning what is important for a good learning environment:

For me, the class environment is crucial in terms of whether I will learn. In our class there are too many students, so I am uncomfortable and unmotivated to learn

Smaller classes, enthusiastic teachers, room for academic discussions and more men.

The failure rate varied in both student groups, but there was almost no difference between the two groups in the percentage of failures in the various subjects. As expected, the take-home examinations had the lowest failure rates. In both student groups, the failure rates were low in psychology. Paradoxically enough, psychology is identified by both groups of students as the subject with the highest threshold of difficulty. The fact that a subject is perceived as difficult to assimilate and that students do not always see its relevance to nursing may have been resulted in the students making an extra effort when studying for the examination.

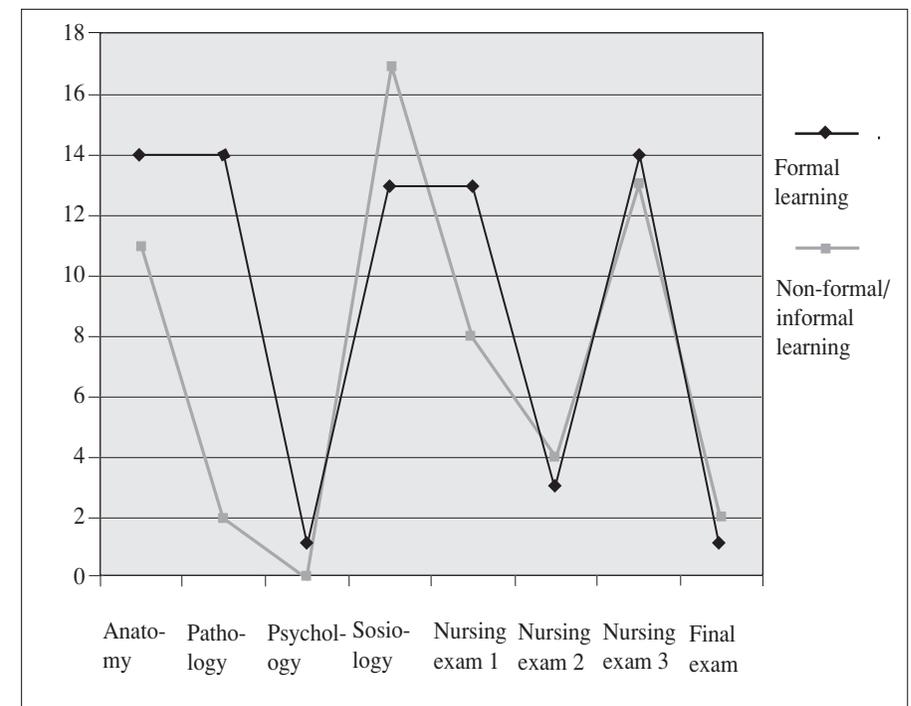


Figure 8: Percent of failure in the various examinations

The failure rates on the exams in pathology and social studies were markedly different in the two student groups. In pathology the failure rate for students with non-formal/informal learning (2%) was much lower than for students with formal learning (14%). One explanation may be that a large number of the non-formal learning candidates were trained as auxiliary nurses and that much of the syllabus in pathology is material they already knew well, while for the majority of the students with formal learning, the material was entirely new. As shown in Figure 8, the failure rate was high in social studies for both student groups. In a total perspective, when the failure rate for the individual exams and the two groups are cross-compared, the failure rate in social studies shows to be greater among students with non-formal learning background.

Job choices as a function of educational background?

For both nurses with non-formal learning background and those having formal learning there is a wide spread in terms of where newly trained nurses seek employment in the health sector. In this particular study, the municipal health sector has a higher percentage of nurses with non-formal/informal learning background (46 %) than nurses with formal learning (28 %). One reason for this may be that a larger share of the nurses with non-formal learning background (86 %) had prior training as auxiliary nurses and worked in the municipal health sector (nursing home or home nursing care) when they began their nursing programme studies in comparison with nurses with formal learning (23 %). Some of the nurses with non-formal/informal learning background were bound up and even written contracts with municipalities to begin work there after completing their education.

Another explanation may be that it is easier to find a permanent position in the municipal health services than in the specialist health services. For the older graduates it is frequently more important to find a permanent job than for those who are younger. When confronted with the option of a permanent job in the municipal health services or a temporary position in the specialist health services, the choice will normally fall on the more secure, permanent position.

Among the nurses with formal learning background, 50 % worked on medical or surgical wards. By comparison, 34 % of the nurses with non-formal learning background worked on medical or surgical wards. From both categories, approximately 20 % worked in the field of psychiatry.

On a scale from 1–7, both at the end of their nursing studies and one year afterwards, a larger segment of the nurses with non-formal learning (5.5) than nurses with formal learning (5.0) felt that the nursing programme had prepared them for their chosen profession. Nurses with non-formal learning background (5.3) indicated to a greater extent than nurses with formal learning (4.7) that the nursing programme's academic content was

relevant in terms of practise. The nurses with non-formal learning background (5.4) also indicated to a much larger extent than nurses with formal learning (4.4) that the study programme is suitable to meet the demands of the future in the nursing profession. Here one sampling error (non response bias) may be that there was a somewhat greater number of respondents from both categories responding to the questionnaire after graduation from the programme than there were respondents who answered the questionnaire one year after graduation.

One year after completing the nursing programme, the nurses were asked to consider whether it was of very great benefit or very small benefit to have formal learning when studying nursing. The nurses with non-formal learning background were likewise asked to consider their educational background on the same basis. On a scale of 1–7 one year after graduation, the nurses with non-formal learning (6.1) rated their background as being significantly beneficial to their profession more than did the nurses who had formal learning (4.7).

The reason why I think I have an advantage with formal learning is that I have learnt to write reports and express myself in writing, as well as to extract the most important material from research sources, because these are things the university college does not teach.

Summary

This study shows that there was no pronounced difference between the two student groups and those students with non-formal/informal learning background mastered their nursing studies on a par with students having formal learning. Being an adult student with relevant prior work experience may be an advantage in several areas of the study programme, particularly since adult students are familiar with the practical aspects and are able to spend less time and energy on acquiring practical skills. Early in the study programme, students with formal learning benefit from their relatively greater academic experience in producing written texts. These differences fade away during the course of the study programme. If one has been away from the academic system for a long time, it takes time to readjust to the role of student, regardless of educational background.

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Yes We Can – How students with formal and non-formal competence manage Accounting and Managerial Economics

Knut Boge

Introduction

Norway's Competence Reform (Realkompetansereformen) in the year 2000 was a turning point for undergraduate profession-oriented studies. Why? Because the Competence Reform opened yet another door granting entrance to undergraduate studies aimed at a profession. The first entrance was the traditional, established one, namely "formal competence"; i.e. completion of upper secondary education and in some instances two years of relevant work experience. The new entrance into academia allowed persons aged 25 or older to be admitted into profession-oriented studies on the basis of so-called "non-formal" and/or "informal competence"; i.e. little or no completed upper secondary education and/or competence acquired through recognized relevant work experience (Holmesland et al. 2001). The Competence Reform thereby made several professions-oriented studies an option for many potential students who until then had been excluded from higher education. Holmesland et al. (2001) investigated how students with recognized non-formal competence managed two of Akershus University College's (AUC) educational programmes: Facility and Service Management (FSM) and Institutional Catering Management (ICM). Their study was carried out immediately after the Competence Reform.

The study presented in this article was conducted from spring 2007 until spring 2008, and expands the work initiated by Holmesland et al. 2001.²⁵ Holmesland et al. (2001:13, 16, 20) came to the conclusion that Accounting and Managerial Economics was one of the main obstacles hindering FSM and ICM students from completing degrees. The mandatory exam in Accounting and Managerial Economics has almost acquired mythical status among new FSM and ICM students. One of the first things new FSM and ICM students learn from senior fellow students is the terrible second term exam in Accounting and Managerial Economics. 27 percent of the

²⁵ In this chapter, *formal competence* and *non-formal/informal competence* carry the same meaning as *formal learning* and *non-formal/informal learning* which is the usual expression in the European context.

FSM and 40 percent of the ICM students failed their spring 2007 exams in Accounting and Managerial Economics. These results gave cause for concern and verily begged the question: How to improve students' learning of Accounting and Managerial Economics?

This article investigates whether there are significant differences between the ways in which students with non-formal and formal competence enrolled in FSM and ICM manage their exam in Accounting and Managerial Economics. This article also investigates whether measures for strengthening the FSM and ICM students' skills in elementary mathematics; i.e. their science literacy, and structural and pedagogical reforms aimed at improving their learning make any difference concerning how these students manage their exams in Accounting and Managerial Economics.

AUC's FSM and ICM educational programmes

The FSM and ICM educational programmes at Akershus University College are both interdisciplinary undergraduate professional studies. Both were established in the 1950s. There were no requirements for formal competence as a prerequisite for admittance to these educational programmes until 1995, when the revised University and College Act (Universitets- og høyskoleloven) established minimum requirements for formal competence, which in turn became the general requirement for admittance to higher education. The revised University and College Act also established vocational training as a qualification for admittance to some of the higher educational programmes. As of 1995, the requirements for access to the FSM and ICM courses of study were a minimum of upper secondary vocational education and a trade certificate (fagbrev), or a minimum set of formal competence (generell studiekompetanse). The trade certificate could be substituted with two years of relevant work experience.

Effective autumn 2000, AUC and certain other university colleges were authorised for a trial period of one year by the Norwegian Ministry of Education to admit students aged 25 or older to some of their undergraduate professional studies. The question was whether the adults' informal or non-formal learning acquired through relevant work experience over a period of at least five years was considered sufficient for the studies in question.

As of autumn 2003 the FSM and ICM educational programmes at Akershus University College were expanded from a two-year candidate programme to a three-year bachelor programme. The FSM education retained its name, but the requirement for a trade certificate (hotellbrev) or two years relevant work experience was abandoned. The new bachelor FSM educational programme is hereafter denoted BFSM to distinguish it from the former two-year candidate programme that was one of the

objects of the study by Holmesland et al. (2001). Thus, as of 2003, students with formal competence alone, e.g. acquired through three years of upper secondary general academic studies (allmenfaglig studieretning), were admitted directly into the current BFSM education, without any requirement in terms of relevant work experience. This change, along with the expansion from a two-year candidate programme into a three-year bachelor degree, revived the FSM educational programme, which at the time was experiencing a decline in the number of applicants for admission.

As of autumn 2003, the ICM programme was also expanded from a two-year candidate course to the current three-year bachelor educational programme, and similarly renamed Bachelor in Food and Catering Management. This new bachelor educational programme is hereafter denoted as BFCM to distinguish it from the former two-year ICM candidate programme which was one of the objects of study in Holmesland et al. (2001). The requirements for a trade certificate and relevant work experience were retained, however, even in the new BFCM educational programme. The requirement for a trade certificate either as a dietary cook (fagbrev som institusjonskokk) or as a chef (fagbrev som restaurantkokk) has effectively constrained the number of applicants to the BFCM educational programme, in contrast to the BFSM educational programme, which was revived by the 2003 reform. The bullish business cycle for restaurants, food and catering corporations, and service companies producing meals since approximately 2003 may also have constrained the number of applicants to the new BFCM educational programme. The booming labour market has namely established very high and often prohibitive alternative costs for many potential BFCM students.

A third difference, that also may have affected the number of applicants to the BFCM educational programme, is the wage level for those who complete the BFCM degree. The relative wage increase in Norway for a certified dietary cook employed by a public sector hospital or nursing home or a chef employed by a private hotel or restaurant who supplements her or his education with a BFCM degree, is considerably less than the relative wage increase for an unskilled blue collar worker employed by one of the service companies who supplements her or his education with a BFSM degree. Unskilled blue collar workers thus have far stronger financial incentives to complete a BFSM degree than skilled cooks have to complete a BFCM degree. Many of AUC's current BFCM students take part in re-education schemes, or benefit from financial support by their employers.

Finally, blue collar workers with no formal qualifications who complete a BFSM degree are almost by default qualified for managerial positions in public administrations or private service companies. Skilled dietary cooks

or chefs may already hold managerial positions, when they enrol as students in AUC's BFCM educational programme. A BFCM degree does not, therefore, necessarily hold the promise of a future managerial position in the food and catering industry.

Can the use of particular teaching methods improve students' mastery of Accounting and Managerial Economics?

It is common to distinguish between surface and depth learning (Marton et al. 1977; Marton and Säljö 1986). Surface learning means the ability to reproduce textbook answers in tests and exams. Depth learning means further development of understanding and the ability to reason about what, why and how one learns. Depth learning thereby develops the students' skills for higher order learning; i.e. metacognitive skills (See for instance Askerøi 1999:204–210). Exaggerated emphasis on surface learning may reduce the students' depth learning (Skodvin 2006:127–128). How to facilitate the students' depth learning or higher order learning? Askerøi (1999: 211, Figure 7) hypothesises that a combination of active teachers and active students facilitate depth learning, while a combination of passive teachers and passive students facilitate surface learning. Askerøi (ibid.) hypothesises similarly that a combination of active teachers and passive students facilitates surface learning despite excellent teaching, while a combination of passive teachers and active students may facilitate depth learning despite poor teaching. Thus, activating the students is one of the teachers' most important means by which to facilitate the students' learning, particularly if the aim is depth learning (Bjørke 2006).

How to activate and motivate the students, in order to promote depth learning? Assessments are one means by which to activate the students. Most students would like to pass their exams; if for no other reason than to keep their financial sponsors happy and to continue their studies. Some students are even concerned about their marks. Proper use of assessments may actually improve the students' learning, particularly their depth learning.

It is common to distinguish between diagnostic, formative, summative and ipsative assessments (CLDP Resource Centre 2008; Lauvås 2003; 2006:92 ff.). Diagnostic assessments are usually used before or early in a learning process, to map the students' actual knowledge level, and to facilitate adaptation of the teaching to the students' actual needs, given the study, term, course and/or the students' learning goals. Formative assessments are feedback during the learning process, in order to improve the students' learning. This feedback can either be given by the teacher, by other students (peer learning) or through combinations of teacher and fellow student responses. The distinction between diagnostic and formative assessments can in some instances be blurred, because diagnostic

assessments can in some instances also be used as formative assessments. Summative assessments are used after the learning process has been completed, to verify whether the students have reached their learning goals. Formative assessments are also used to rank the students if this is considered desirable. Ipsative assessments are used during supervision or counselling, to assess whether the supervised or counselled student performs according to her or his potential.

Research has shown that formative assessments are catalysts for effective learning. Teaching at some of the world's most prominent universities is characterized by liberal and frequent use of formative assessments (Gibbs and Dunbar-Goddet 2007; Lauvås 2003). Formative assessments, such as mandatory exercises, student presentations, writing of reaction and term papers, etc., can thus be very useful means by which teachers may establish learning situations that improve the students' opportunities for learning.

Accounting and Managerial Economics shares many similarities with mathematics, because both subjects are based on logical reasoning, models, formulas and calculations. Many students learn mathematics and other quantitative subjects better from doing exercises and solving practical problems than through traditional lectures. This observation was utilized by those at Østfold University College (ØUC) responsible for teaching the teacher candidates in mathematics. ØUC's teacher candidates had a similar failure rate in a mandatory course in mathematics as AUC's BFSM and BFCM students had in their mandatory course in Accounting and Managerial Economics. 54 percent of ØUC's teacher students failed their autumn 2003 exam in mathematics, and 2/3 of those who passed the exam received an E. ØUC's remedy was the introduction of mandatory weekly sets of exercises in mathematics for the teacher candidates. These weekly exercises were used to provide students with formative assessments. This implementation reduced the teacher students' failure rate in their mandatory mathematics exam from 54 to 15 percent (Lauvås 2006:100-102). ØUC's experiences with formative assessments indicate that formative assessments may improve the students' learning.

Formative assessments thus improve the students' learning, but often at the expense of the teachers. The price for increased formative assessments of the students is very often increased workload for the teachers. One alternative that may increase the students' amount of formative assessment, but not the teacher's workload, is the systematic use of peer-assessments (peer-learning) as a replacement for or as a supplement to teacher assessment (Topping 1998). This is exactly what ØUC did in their mandatory course for the teacher students. The teacher candidates corrected and scored their fellow students' weekly set of exercises, after the teacher had recorded the names of the students who had submitted their

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exercises. Those students who submitted their weekly exercises were dismissed from class both when the weekly exercises were scored and corrected by the fellow students and when they were commented upon by the teacher (Lauvås 2006:101–102). Systematic use of peer-assessment at ØUC thus greatly increased the average number of formative assessments during the students' mandatory course in mathematics, while keeping the teachers' workload fairly constant. Introduction of mandatory weekly exercises and peer assessments therefore met with great success at ØUC. The evidence of this was seen in significantly improved exam results in mathematics among ØUC's teacher students. Social pressure from fellow students was an unintended but very likely positive side effect of introducing the weekly exercises. This positive peer pressure may have somewhat stimulated the teacher students' motivation to successfully complete their weekly exercises. This in turn may have improved their performance in the mandatory course in mathematics.

This study's analytical model and basic assumptions

This study focusing on how AUC's formal and non-formal competence BFSM and BFCM students manage Accounting and Managerial Economics is carried out as a comparative case study, based on a most similar systems design. The aim is to identify the critical factors that explain the differences between BFSM and BFCM students and between formal and non-formal competence students. See for instance Yin (1994) concerning case studies, and Tranøy (1993:24–25) concerning comparative designs.

The most important data sources in this study are the BFSM and BFCM students' marks in Accounting and Managerial Economics, the students' results in voluntary tests in elementary mathematics, and observations of these students during teaching, supervision and counselling in Accounting and Managerial Economics. Another useful data source has been informal coffee-break discussions with some of the students. Some of the quantitative data have been analyzed statistically through use of SPSS. Other quantitative and qualitative data have been used "as is" to establish chains of evidence.

This study is based on a rather simplistic analytical model. The dependent variable or the study object is how the formal and non-formal competence BFSM and BFCM students manage their exam in Accounting and Managerial Economics. The measurement scale here is simply the students' marks in their Accounting and Managerial Economics exams. A and B are here considered excellent results. C and D are considered adequate or satisfactory results. E and F are considered inadequate results.

Many BFSM or BFCM students struggle with science illiteracy. This assumption is based on empirical observations. Many of the BFSM and BFCM students manage most subjects fairly well, but struggle with

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Accounting, Managerial Economics and Chemistry, such as noticed by among others Holmesland et al. (2001). Chemistry and Accounting and Managerial Economics differ somewhat from many other subjects taught in the BFSM and BFCM study programmes, because the answers in Chemistry and Accounting and Managerial Economics are very often "right" or "wrong". However, there is currently hardly any measurable difference in performance between BFSM and BFCM students accepted at AUC because of their formal or non-formal competence when they reach their second and third year, even though many of the BFSM and BFCM students with non-formal competence struggle during their first year as students. Holmesland et al. (2001:21) found that many non-formal competence FSM and ICM students catch up with their fellow students with formal competence during the course of the studies, once they become used to their new roles as students. This is still the case for many non-formal competence BFSM and BFCM students. The exam in Accounting and Managerial Economics is thus an important mechanism for weeding out those students who are unable or unwilling to invest the time and effort needed to complete their bachelor degree.

The results of the BFSM and BFCM students with formal and non-formal competence on their mandatory exams in Accounting and Managerial Economics are assumed to be determined by one background variable and two intermediate variables. The intervening variables' configurations are of particular interest in this study.

The background variable is the BFSM and BFCM students' recognized formal or non-formal competence. The BFSM and BFCM students' de facto knowledge and skills levels vary significantly, regardless of their recognized formal or non-formal competence. One method for determining these students' de facto knowledge or skills level is testing their skills in elementary mathematics. The BFSM and BFCM students' actual status as formal or non-formal competence students, combined with their results in a diagnostic test of their operational skills in elementary mathematics, can thus be used as an indicator or proxy for their de facto knowledge and skills level. The skills in elementary mathematics are usually the starting point for learning Accounting and Managerial Economics for students who have not become familiar with Accounting and Managerial Economics during their upper secondary education.

This study is based on the assumption that students with strong de facto skills in elementary mathematics, all other things being equal, learn Accounting and Managerial Economics more easily than students with poor de facto skills in elementary mathematics. Skills in mathematics develop the students' ability to interpret information and to draw conclusions, according to Kjærnsli (2007). However, the assumption concerning the students' ability to transfer skills from one subject or area to other

subjects or areas is contested. Studies by Stevenson (2002), Searle (2002) and others, indicate that workplace literacies are situated and socially constructed.

One means by which to investigate whether the students' general skills level affects their exam results in Accounting and Managerial Economics is to utilize correspondence analysis between the students' test results in elementary mathematics, converted to marks, and their marks in Accounting and Managerial Economics. Correspondence analysis requires only cross tabulated data with low measurement level in a rectangular data matrix (Hair et al. 1998:548–555). One frequently used statistical test of whether there are systematic relations or not between the correspondence analysis' two variables, is the Chi-square (X^2) test. The X^2 test is based on testing two hypotheses. H_0 is that there are no systematic relations between the two variables. H_{Alt} is that there are systematic relations between the two variables. H_0 is rejected if the X^2 value is equal to or larger than the critical value, given the desired significance level and actual degrees of freedom. The degrees of freedom are simply the product of the data matrix' number of rows and columns. The significance level is determined by the researcher's requirement for significance, but is usually 0.05 or 0.1; i.e. 95 or 90 percent certainty. It is thus not possible to reject H_0 if the X^2 value is smaller than the critical value, given the researcher's desired significance level, and the data set's degrees of freedom. (Newbold 1991: 434–439, 891–892; Hellevik 1991: 350–353). However, there are some critical issues concerning use of the X^2 test. The X^2 value is very sensitive to the sample size. There is thus a risk of not rejecting H_0 if the samples are small. Very small differences may similarly become statistically significant if the samples are very large (Hair et al. 1998:280–281).

The first intervening variable is the teaching of Accounting and Managerial Economics at AUC. Important determinants here include the teachers' professional skills and motivation. Another important determinant is how the teaching is organized and the teaching methods that have been used. Examples of such organizing elements or teaching methods are use of formative assessments, mandatory exercises and peer-learning. Another important determinant is whether the teachers have been active or passive. One way of measuring the effects of the teachers and their teaching methods is to investigate the students' exam results during time. Have changes concerning teachers, teaching methods, organizing of the teaching, exams, etc. affected the students' exam results in Accounting and Managerial Economics, or is the students' exam performance in Accounting and Managerial Economics only a result of random variations?

The second intervening variable affecting the students' learning of Accounting and Managerial Economics is the individual student's motivation and learning strategy. The assumption is that highly motivated and

active students, all other things being equal, learn Accounting and Managerial Economics better than poorly motivated and passive students. It is also assumed that some learning strategies are more productive than others, in terms of both the students' exam results and particularly concerning the students' learning. Ways of determining the students' motivation and learning strategies are for instance observations of the students' physical presence and participation in class, cooperation with other students, in addition to interviews and discussions with the students.

Accounting and Managerial Economics – one of the BFSM and BFCM students' main obstacles

How are AUC's teachers to cope with the fact that Accounting and Managerial Economics has become one of the main obstacles between BFSM and BFCM students and their bachelor degrees? The BFSM and BFCM students' difficulties with Accounting and Managerial Economics represent both a puzzle and a challenge. Managing Accounting and Managerial Economics is a necessary but insufficient prerequisite for the students' academic success at AUC. Managing Accounting and Managerial Economics is also a necessary but insufficient condition for the students' professional success after they have graduated from AUC. This puzzle was the point of departure for the study leading to this article. It became evident both during the spring 2007 lectures and after the spring 2007 exam, as well as after the autumn 2007 makeup exam that teaching BFSM and BFCM students Accounting and Managerial Economics in a manner similar to the way it is done in ordinary business schools, was unfruitful.

One absolute requirement for admittance to AUC's BFSM and BFCM bachelor educational programmes, regardless of whether the students are accepted on the basis of their formal or non-formal competence, is mastery of the upper secondary school's syllabus in elementary mathematics. However, numerous questions from BFSM and BFCM students during the spring 2007 lectures in Accounting and Managerial Economics made it evident that many of these students struggled with elementary mathematics. There were hardly any noticeable differences between the formal competence and non-formal competence students in the area of elementary mathematics. Several of the frequently asked questions indicated that many students were more concerned with the mathematical operations than with the logic of accounting or the principles of managerial economics. 82 percent of the BFSM students who completed the ordinary spring 2007 exam in Accounting and Managerial Economics were formal competence students, compared to 40 percent among the BFCM students. Thus, more non-formal competence BFCM students than non-formal competence BFSM students completed their spring 1007 exams in Accounting and Managerial Economics.

Something had to be done. The assumption was that by boosting the confidence of students in their skills in elementary mathematics may, all things being equal, increase the likelihood of their passing the exam (summative evaluation) in Accounting and Managerial Economics. Why is it so important for the first year BFSM and BFCM students to pass their exams in Accounting and Managerial Economics? First, the students have to pass their exams in every course or subject in order to complete their BFSM or BFCM degrees. Second, both the facility and service management and the food and catering management professions are founded on an economic logic; i.e. how to household with scarce resources. Managing elementary Accounting and Managerial Economics is therefore crucial to the students' performance in many of the other subjects of the study, which also are based on an economic logic.

How to improve these students' confidence in their skills in elementary mathematics? One mean was offering the students a voluntary diagnostic test in elementary mathematics (Myhre's diagnostic test), during the spring 2007 course in Accounting and Managerial Economics. Myhre's test was revised by Kolbjørnsen et al. (2006). Myhre's diagnostic test was offered to the students for three reasons: First, to assess each individual student's skills level in elementary mathematics; second, to provide each individual student with a better understanding of where and why they struggled so that they could improve their own skills, and finally to provide the teacher with the necessary knowledge that made it possible to adapt the teaching in managerial economics to the students' skills in elementary mathematics. Myhre's diagnostic test was used both for diagnostic and formative assessments of AUC's first year BFSM and BFCM students. The second move, in spring 2007, was to offer the first year BFSM and BFCM students a voluntary "crash course" in elementary mathematics. Improved skills in elementary mathematics would hopefully facilitate the shift of attention from basic mathematical operations to managerial economics.

An eye-opener concerning students' skills

During the years, AUC's teachers have noticed the BFSM and BFCM students' varying motivation and skills level. Some students consider AUC's BFSM or BFCM educational programmes their window of opportunity for social climbing, and work accordingly. Other students have a more relaxed attitude. The spring 2007 voluntary diagnostic test in elementary mathematics (N = 26) was an eye-opener, concerning these students' skills level.²⁶

²⁶ Maximum possible score on this diagnostic test, covering the lower secondary school's syllabus (questions 84-145 on the test), was 122 points. Each question or task was scored with 2 points for correct answer or reasoning, 1 point for partly correct answer or reasoning and 0 point for no answer, wrong answer or wrong reasoning. Each student's result was plotted into a radar diagram, which is the second part of Myhre's diagnostic test.

This first diagnostic test confirmed several of the teachers' presumptions, namely that many BFSM and BFCM students struggle with fractions, division, percent, functions and algebra. The BFSM and BFCM students' average score on these questions was merely 26.4 percent correct answers. Probability and statistics were also problem areas. The average scores here were 34.7 and 35.4 percent. Even calculating circumference and area in various geometric figures represented a problem. The average score in these questions was 36.5 percent correct answers.

Were there any differences between the formal and non-formal competence BFSM and BFCM students' scores in the spring 2007 diagnostic tests? Yes there were, as shown in Table 1.

Table 1: The BFSM (N = 20) and the BFCM (N = 6) students' raw score in the spring 2007 voluntary diagnostic test in elementary mathematics

	Those BFSM and BFCM students who took the test (N = 26)		Formal competence BFSM and BFCM students (N = 18)		Non-formal competence BFSM and BFCM students (N = 8)	
	#	%	#	%	#	%
Average	68	56	66	54	72	59
Median	61	50	61	50	64	52
Maximum	116	95	116	95	103	84
Minimum	28	23	28	23	50	41
Spread	88	–	88	–	53	–

The test results presented in Table 1 revealed that non-formal competence BFSM and BFCM students (N = 8) performed on the average far better in elementary mathematics than their fellow students with formal competence (N = 18) in the spring 2007 diagnostic test. The non-formal competence students' average and median scores were somewhat above the formal competence students' average and median scores. The non-formal competence students' maximum score (103) was similarly somewhat smaller than the formal competence students' maximum score (116). But the non-formal competence students' minimum score (50) was 32 points above the formal competence students' minimum score (28)! The non-

This radar diagram is the main feedback mechanism or formative assessment of the students that have been tested. This radar diagram significantly simplifies the teacher's feedback to each individual student, because the diagnostic test's questions are clustered into sectors according to which problems or skills they assess. A completed radar diagram provides thus a condensed picture of each individual student's knowledge level and profile within various fields of elementary mathematics. The test results were registered manually in an Excel spreadsheet, among other reasons for further analysis in SPSS statistical software.

formal competence students' spread (53) was thus significantly smaller than the formal competence students' spread (88). The spring 2007 test thereby revealed that those non-formal competence BFSM and BFCM students who took the test very often performed better than their fellow formal competence students.

80 percent of those BFSM students who took the spring 2007 voluntary diagnostic test in elementary mathematics were formal competence students, compared to 81 percent among those BFSM students who had signed up for the spring 2007 exam in Accounting and Managerial Economics. The average score for those BFSM students who took the voluntary diagnostic test (N = 20) was 66 (54 percent). Their maximum score was 116 points (95 percent). Their minimum score was 28 points (23 percent). The BFSM students' median score was 59 points (48 percent). The diagnostic test thus revealed a significant difference between those BFSM students with strong and weak skills in elementary mathematics. The spread was 88 points, or 72 percent of the maximum score.²⁷

The BFCM students' average score in the spring 2007 voluntary diagnostic test in elementary mathematics was 74 points (61 percent), 8 points above the BFSM students. The BFCM students' maximum score was 103 points (84 percent), 13 points less than the BFSM students' maximum. The BFCM students' minimum score was 56 points (46 percent), twice the BFSM students' minimum score! The BFCM students' median score was 72 points (59 percent), 13 points above the BFSM students' median score. The BFCM students' spread was only 47 points, or 39 percent of the maximum score, compared to the BFSM students' 88 points, or 72 percent of the maximum score. The BFCM students on the average thus

²⁷ The formal competence BFSM students' average score (N = 16) was 65 points (53 percent). Their maximum score was 116 points (95 percent). Their minimum score was 28 points (23 percent). Their median score was 53 points (43 percent). The formal competence BFSM students' distribution was significantly skewed in the weak direction, due to the 12 points gap between the average and the median, and the 88 points spread between the maximum and minimum scores. The non-formal competence BFSM students' average score (N = 4) was similarly 70 points (57 percent), 5 points above the formal competence BFSM students' average. The non-formal competence BFSM students' maximum score was 102 points (84 percent), 14 point less than their fellow formal competence BFSM students' maximum. However, the non-formal competence BFSM students' minimum score was 50 points (41 percent), 22 points above the formal competence BFSM students' minimum. The non-formal competence BFSM students' median was similarly 64 points (52 percent); 11 points above the formal competence BFSM-students' median. The non-formal competence BFSM students' spread was 52 points or 61 percent of the maximum score, 36 points less than the formal competence BFSM students' spread. The non-formal competence BFSM students' average scores on this diagnostic test were thus significantly above the formal competence BFSM students' average scores.

performed significantly better on the voluntary diagnostic test than their fellow BFSM students.²⁸

The voluntary spring 2007 diagnostic test in elementary mathematics revealed that many of AUC's first year BFSM and BFCM students struggled with elementary mathematics. This was particularly the case for some of the formal competence BFSM students! There were also some formal competence BFSM students, however, who did very well on this diagnostic test. This voluntary diagnostic test thereby confirmed several earlier suspicions and observations, namely that many BFSM and BFCM students struggle with fractions, division, percent and algebra. This test also revealed that non-formal competence BFSM and BFCM students on the average performed better in elementary mathematics than many formal competence BFSM students! It was assumed that many students with formal competence had most likely barely passed their exams in the upper secondary school's course in elementary mathematics.

How to explain this puzzle? One explanation for the fact that non-formal competence BFSM and BFCM students in general performed better on this test than their fellow formal competence BFSM and BFCM students may be that particularly the students with non-formal competence were significantly older than their fellow formal competence BFSM students. Norwegian students' math skills have deteriorated significantly since the 1980s. This has been demonstrated through the Norwegian Mathematics Council's (Norsk Matematikkråd) annual tests (See for instance Rasch-Halvorsen and Johnsbråten 2002:6 Table 1; 2004:3–5). First, Norwegian primary and secondary schools' syllabus in elementary mathematics has been significantly simplified since the 1970s. Secondly, the Norwegian primary school's number of formally qualified mathematics and science teachers has diminished significantly since the 1970s. The teachers' poor skills in elementary mathematics since the late 1970s may thus explain why their pupils did not do as well in elementary mathematics than older

²⁸ 4 of the 6 BFCM students who took the voluntary diagnostic test were non-formal competence students. The formal competence BFCM students' average score was 8 points above, and their median score was 20 points above their fellow formal competence BFSM students' test scores. However, the formal competence BFCM students' maximum was only 84 points (69 percent), 32 points below the formal competence BFSM students' maximum score. The formal competence BFCM students' minimum score was 34 points above the formal competence BFSM students' minimum score. The formal competence BFCM students' spread was similarly only 22 points, compared to 88 points among the formal competence BFSM students. The non-formal competence BFCM students' test scores were very similar to the non-formal competence BFSM students' test scores, except for the median, which was 8 points above the formal competence BFSM students' median. The non-formal competence BFCM students' spread was 5 points less than the non-formal competence BFSM students' spread.

non-formal competence students who had competent teachers and learnt their elementary mathematics.

Some of AUC's teachers have also noticed that BFCM students on average have often been more highly motivated than BFSM students, even though only a fraction of the BFCM students are formal competence students. One explanation of this observation may be the BFCM students' alternative costs. Those who quit reasonably well paid jobs to continue their education often become diligent students. An alternative or supplementary explanation is that most BFCM students are well aware of their lack of formal knowledge, compared to the majority of BFSM students who are formal competence students. Dedicated and motivated non-formal competence students often work hard to catch up with their fellow formal competence students. The age explanation can also be relevant for the non-formal competence BFSM students, because most non-formal competence BFCM students are somewhat older than their fellow students with formal competence. But the non-formal competence BFCM students are usually not as old as their peers with non-formal competence.

The BFSM and BFCM students' spring 2007 exam results in Accounting and Managerial Economics compared to their scores on their diagnostic tests

Managing elementary mathematics is a necessary but insufficient prerequisite for mastering Accounting and Managerial Economics. The effects of the spring 2007 voluntary crash course in elementary mathematics were hard to detect, very likely due to the first year BFSM and BFCM students' very tight timetable from February until May when the mandatory course in Accounting and Managerial Economics took place. These extra lessons were taught only a few weeks ahead of the exam in Accounting and Managerial Economics.

The BFSM and BFCM students' exam results in Accounting and Managerial Economics spring 2007 were not particularly impressive. 73 percent of the BFSM students and 60 percent of the BFCM students passed this exam. But only 10 percent of those BFSM students who accomplished the spring 2007 exam achieved top results (A and B). 28 percent performed adequately (C and D). 63 percent performed inadequately (E and F). 36 percent achieved mediocre results (E) and 27 percent failed (F). However, the situation was far worse among the BFCM students, even though on average they had performed far better than the BFSM students on the voluntary diagnostic test in elementary mathematics. None of the BFCM students achieved A, B or C in the ordinary spring 2007 exam in Accounting and Managerial Economics. The best 10 percent achieved D! 90 percent performed inadequately (E and F). 50 percent achieved E, and 40 percent failed (F)!

How to explain these results? The course in Accounting and Managerial Economics has always been considered difficult, but these results were alarming. Were these results a consequence of poor teaching, students with poor skills in elementary mathematics (i.e. science illiteracy), poorly motivated students, a difficult syllabus, or combinations of all of these factors? Or were these results simply caused by random variations among the student peers?

Were there any systematic relationships between the BFSM and BFCM students' competence levels, measured as formal and non-formal competence when they were accepted as students at AUC and their marks on the mandatory spring 2007 exam in Accounting and Managerial Economics?

The answer to this question was partly yes for the BFSM students. The BFSM students' correlation between formal (high) and non-formal competence (low) and their marks on their spring 2007 exam in Accounting and Managerial Economics (N = 22) was 0.16. 0.16 indicates a weak positive correlation, which means that formal competence BFSM students (high) were weakly associated with good marks (high), while their fellow non-formal competence BFSM students (low) were associated with low marks (low). Did this statistical result make sense compared to the spring 2007 exam results? Yes, 12 percent of the formal competence BFSM students achieved top marks (A and B), 28 percent performed acceptably (C and D), and 61 percent performed inadequately (E and F). The non-formal competence BFSM students' exam results differed somewhat, because 0 percent performed excellent (A and B), 25 percent performed acceptable (C and D) and 75 percent performed inadequate (E and F)!

What about the BFCM students? There was hardly any correlation between the BFCM students' formal (high) and non-formal (low) competence and their marks on the spring 2007 exam in Accounting and Managerial Economics. The BFCM students' (N = 10) correlation was 0.06. This indicates almost no correlation between formal competence (high) and good marks (high) or non-formal competence (low) and poor marks (low) on their spring 2007 exam in Accounting and Managerial Economics. None of the formal competence BFCM students achieved excellent marks (A and B). 25 percent performed adequately (D). 75 percent of the formal competence BFCM students performed inadequately (E and F)! None of the non-formal competence BFCM students achieved top marks (A and B) or performed adequately (C and D). All non-formal competence BFCM students performed inadequately (E and F) on their spring 2007 exam in Accounting and Managerial Economics!

How to explain the BFSM and BFCM students' mediocre results in their spring 2007 exam in Accounting and Managerial Economics? These outcomes may be a result of several causes, combinations of, or interaction between two or more causes. Such causes include poor teaching, passive teachers, students with poorly developed skills in elementary mathematics and other subjects necessary to manage Accounting and Managerial Economics (i.e. science illiteracy), poorly motivated and passive students, students suffering from dyslexia and/or dyscalculia and/or students with inefficient learning strategies.

Were there substantial differences between the various categories of students' performance in the spring 2007 exam in Accounting and Managerial Economics and their performance in the spring 2007 voluntary diagnostic test in basic mathematics? If yes, were there any patterns in these differences? These questions are further investigated through analyses of data presented in Tables 2 and 3, which compare the formal competence and the non-formal competence students' performance in the spring 2007 diagnostic tests with their performance in the spring 2007 exam in Accounting and Managerial Economics. The students' scores on the diagnostic test were converted to marks according to the formula used for summative assessment of the course in Accounting and Managerial Economics.

In order to figure out whether science illiteracy was present, we have to dig deeper into the material; i.e. through further analysis of the various categories of BFSM and BFCM students' performance on the spring 2007 voluntary diagnostic test compared to how they performed on their spring 2007 exam in Accounting and Managerial Economics. If there is a direct linear relationship between the students' performance on the voluntary diagnostic test in elementary mathematics and their performance on the exam in Accounting and Managerial Economics, then their marks will plot along the diagonal AA, BB, CC, DD, EE and FF in Table 2 and 3. If the students performed better on their exam in Accounting and Managerial Economics than on the voluntary diagnostic test in elementary mathematics, then their marks plot below the diagonal AA-FF in Table 2 and 3. Those students who performed better on the voluntary diagnostic test in elementary mathematics than on their exam in Accounting and Managerial Economics thus plot above the diagonal in Table 2 and 3.

Table 2:
The formal competence BFSM and BFCM students' (N = 15) results on their diagnostic tests compared to their spring 2007 exams in Accounting and Managerial Economics

	Formal competence BFSM students (N = 13) and BFCM students (N = 2)						
	F	E	D	C	B	A	
Spring 2007 exam in Accounting and managerial economics					1	2	1
			3			3	
					1		
						2	
					1		
		1					
	A	B	C	D	E	F	
	Diagnostic test in mathematics						

6 of the 13 formal competence BFSM students who took the spring 2007 voluntary diagnostic test in elementary mathematics and the spring 2007 exam in Accounting and Managerial Economics plot along the diagonal AA-FF. 4 of the students plot above and 3 below the diagonal. Thus, 46 percent of the formal competence BFSM students who took the voluntary diagnostic test and the 2007 spring exam in Accounting and Managerial Economics have a linear relationship between their skills in elementary mathematics and their performance on the exam in Accounting and Managerial Economics. Approximately 31 percent of the formal competence BFSM students plot above below the diagonal. 23 percent plot below. Thus, approximately 69 percent of the formal competence BFSM students who took the voluntary diagnostic test and the exam either plot along or below the diagonal. This finding indicates that most formal competence BFSM students who took the voluntary diagnostic test and the exam have been able to utilize their skills in elementary mathematics in Accounting and Managerial Economics. These findings weaken the hypothesis that science illiteracy was present among those formal competence BFSM students who took the spring 2007 diagnostic test and the spring 2007 exam in Accounting and Managerial Economics, except for the 4 students who plot above the diagonal.

Both formal competence BFCM students plot above the diagonal. They have thus not been able to utilize their skills in elementary mathematics in Accounting and Managerial Economics. The hypothesis about science illiteracy is therefore not ruled out for those formal competence BFCM students who took the spring 2007 voluntary test and the spring 2007 exam in Accounting and Managerial Economics.

How do these findings compare to the correlation between the formal competence BFSM and BFCM students' performance on the spring 2007 voluntary test in elementary mathematics and their performance on the spring 2007 exam in Accounting and Managerial Economics? The formal competence BFSM students' (N = 13) correlation was 0.47, which indicates a fairly strong positive correlation between the formal competence BFSM students' performance in the diagnostic test and their performance on the exam in Accounting and Managerial Economics, which means that those who manage elementary mathematics usually also manage Accounting and Managerial Economics, and vice versa. It is thus not possible to rule out the hypothesis about science illiteracy for those formal competence students not able to utilize their skills in elementary mathematics in Accounting and Managerial Economics.

The correlation between the formal competence BFCM students' result on the diagnostic test and the exam in Accounting and Managerial Economics is not of particular interest because of the very small sample (N = 2). But both formal competence BFCM students in Table 3 plot above the diagonal, which indicates they have not been able to transfer their skills in elementary mathematics to Accounting and Managerial Economics. It is therefore not possible to rule out the hypothesis about science illiteracy for these students.

Table 3: The non-formal competence BFSM and BFCM students' (N = 7) performance in the diagnostic test compared to their spring 2007 exam in Accounting and Managerial Economics

		Non-formal competence BFSM students (N = 4) and BFCM students (N = 3)					
Spring 2007 exam in Accounting and managerial economics	F		1			2	
	E				1		
	D			1		1	
	C		1				
	B						
	A						
		A	B	C	D	E	F
		Diagnostic test in mathematics					

Table 3 shows the non-formal competence BFSM and BFCM students' performance on the voluntary diagnostic test in elementary mathematics compared to their 2007 spring exam in Accounting and Managerial Economics. All of the non-formal competence BFSM and BFCM students, except one BFCM student (ED), plot above the diagonal AA-FF. Only the non-formal competence BFSM student in square BC and the non-formal competence BFCM student in square CD benefited somewhat from their

skills in elementary mathematics when they had their exams in Accounting and Managerial Economics. The other BFSM and BFCM students with non-formal competence made poor use of their skills in elementary mathematics. It is thus not possible to rule out the hypothesis about science illiteracy even concerning these non-formal competence students. But these indications have to be interpreted very carefully, because of the very small samples of students.

The non-formal competence BFSM and BFCM students' correlations between their marks on the diagnostic test and their marks on the spring 2007 exam in Accounting and Managerial Economics were strongly positive, 1,0 for the non-formal competence BFSM students (N = 4) and 0,76 for the non-formal competence BFCM students (N = 3). These results seem reasonable because low marks on the diagnostic tests usually came together with low marks on the exam, such as shown in Table 3.

A correspondence analysis between the formal and non-formal competence BFSM students' performance on the spring 2007 diagnostic test in elementary mathematics and their performance on their spring 2007 exams in Accounting and Managerial Economics (N = 17) indicated systematic relations between these students' test and exam results, which were significant on the 0,1 level. Thus, the X^2 test made it possible to reject H_0 that there was no systematic relationship between test results and exam results among the BFSM students. The X^2 test thereby strengthened H_{Alt} , namely that in spring 2007 there were systematic relationships between the BFSM students' test results and exam results. Thus, the BFSM students' results on the voluntary diagnostic test in elementary mathematics very often gave a good indication of their performance on the spring 2007 exam in Accounting and Managerial Economics.

A similar correspondence analysis between the formal and non-formal competence BFCM students' performance on their spring 2007 diagnostic test in elementary mathematics and their performance on their spring 2007 exams in Accounting and Managerial Economics (N = 5) offered no reason to reject H_0 , namely no systematic relationships between the BFCM students' test and exam results spring 2007. Thus, the BFCM students' performance on the voluntary diagnostic test in elementary mathematics gave no significant indication of their performance on the spring 2007 exam in Accounting and Managerial Economics. However, the BFCM students' low value in the X^2 test can be a result of the small sample, because the X^2 test is very sensitive to the sample size.²⁹

²⁹ A correspondence analysis between all formal and non-formal competence BFSM and BFCM students' performance on the spring 2007 diagnostic test in elementary mathematics and their performance on their spring

Some of the findings in Table 2 and 3 represent a puzzle. A number of formal competence BFSM students who achieved mediocre or poor results on the diagnostic test in elementary mathematics did fairly well on their spring 2007 exam in Accounting and Managerial Economics. It was similarly those non-formal competence BFCM students who did fairly well on the diagnostic test in elementary mathematics and who performed mediocre or failed their exams in Accounting and Managerial Economics.

The question is thus, has formal training in upper secondary high school taught the formal competence students something that the non-formal competence students with seemingly superior skills in elementary mathematics have missed? This missing thing may be science literacy, or the ability to transfer knowledge and skills from one subject area to another. However, many formal competence BFSM students have mediocre knowledge of elementary mathematics, according to their diagnostic tests, despite their formal training in upper secondary school.

Did those BFSM and BFCM students who took the voluntary spring 2007 diagnostic test in elementary mathematics differ from the students who did not take this test? Those BFSM and BFCM students who volunteered for the diagnostic test may not be representative, because taking the test or abstaining from the test was governed by self selection. Students with mediocre skills in elementary mathematics could have perceived the voluntary diagnostic test as a potential life buoy. Students with strong skills in elementary mathematics could similarly have considered the diagnostic test as an opportunity to demonstrate their skills for the teachers and fellow students. Students with mediocre skills in elementary mathematics could similarly have perceived the test as the risk of yet another failure, and thereby abstained from the test. Students with strong skills in elementary mathematics could similarly have considered the diagnostic test as a waste of time, and thereby abstained from the test. We cannot tell, therefore, whether those students who took the test were representative until we have examined both categories of students' exam results; i.e. those who took the test and those who did not take the test.

Table 4 provides an overview of the performance in Accounting and Managerial Economics for those BFSM and BFCM students who took the diagnostic test prior to their spring 2007 exams in Accounting and Managerial Economics and the exam performance for those students who abstained from this diagnostic test.

Table 4: The BFSM and BFCM students' performance in the spring 2007 exam in Accounting and Managerial Economics (N = 32)

Mark	BFSM students who took the diagnostic test (N = 17)		BFSM students who did not take the diagnostic test (N = 5)		BFCM students who took the diagnostic test (N = 5)		BFCM students who did not take the diagnostic test (N = 5)	
	#	%	#	%	#	%	#	%
A	1	6	0	0	0	0	0	0
B	1	6	0	0	0	0	0	0
C	3	18	0	0	0	0	0	0
D	2	12	1	20	0	0	1	20
E	6	35	2	40	2	40	3	60
F	4	24	2	40	3	60	1	20

2007 exams in Accounting and Managerial Economics (N = 22) indicated systematic relationships between these students' test and exam results, which were significant on the 0.05 level. The X^2 test thus made it possible to reject H_0 that there were no systematic relationships between the BFSM and the BFCM students' test and exam results spring 2007. The X^2 test thereby strengthened H_{Alt} , namely that in spring 2007 there were systematic relationships between the BFSM and the BFCM students' test and exam results. Thus, the 2006 class of BFCM and BFSM students' results on the voluntary diagnostic test in elementary mathematics very often gave a good indication of their performance on the spring 2007 exam in Accounting and Managerial Economics.

The findings in Table 4 are interesting. First, the vast majority of BFSM students availed themselves of the opportunity to take the voluntary diagnostic test prior to their spring 2007 exam in Accounting and Managerial Economics. Second, it was clearly those BFSM students with strongest de facto competence who took the voluntary diagnostic test. Those BFSM students with weak de facto competence, who really would have benefited from the information provided by the diagnostic test, chose not to take this test. The failure rate among those BFSM students who took the voluntary diagnostic test was 24 percent. The failure rate among those BFSM students who did not take the test was 40 percent. The BFSM students' total failure rate in the spring 2007 exam in Accounting and Managerial Economics was 27 percent.

Table 4 also indicates that BFCM students differed somewhat from the BFSM students. First of all, only half the BFCM students took the test; the other half did not. Second, the BFCM students' exam results were completely the opposite of the BFSM students' exam results, because those BFCM students who took the voluntary diagnostic test were clearly the students with the weakest de facto competence. 60 percent of the BFCM students who took the diagnostic test failed their exam in Accounting and Managerial Economics. Only 20 percent of those BFCM students who abstained from the test failed their exam in Accounting and

Managerial Economics. The BFCM students' total failure rate in the spring 2007 exam in Accounting and Managerial Economics was 40 per cent.

Thus, it seems the BFSM and BFCM students have had completely opposite views of the voluntary spring 2007 diagnostic test in elementary mathematics. One interpretation is that the most ambitious and/or those BFSM students with strongest de facto competence chose to take the test, while the most ambitious BFCM students and/or the students with strongest de facto competence abstained from this voluntary test. One can only speculate about this result. Did the BFSM and BFCM students who chose not to take the voluntary diagnostic test prior to the spring 2007 exam in Accounting and Managerial Economics differ from the students who took the voluntary diagnostic test, in terms of their status as formal or non-formal competence students?

The 5 BFSM students who chose not to take the voluntary diagnostic test were all formal competence students. Their exam results in Accounting and Managerial Economics, compared to those BFSM students who took the voluntary diagnostic test, may indicate that the formal competence BFSM students who abstained from the voluntary diagnostic test were somewhat overconfident about their own skills.

The situation among the BFCM students was somewhat different, because exactly half the number of students who took the spring 2007 exam in Accounting and Managerial Economics took the voluntary diagnostic test before the exam. The other half did not. These halves were also similar concerning formal and non-formal competence status, because of 2 formal and 3 non-formal competence students in each group of students taking and those not taking the voluntary test. Thus, those BFCM students who chose not to take the voluntary diagnostic test prior to the spring 2007 exam in Accounting and Managerial Economics did not differ from those BFCM students who chose to take the test with regard to status as formal or non-formal competence students. It seems that those BFCM students who abstained from the voluntary diagnostic test prior to the spring 2007 exam in Accounting and Managerial Economics had a fairly realistic idea about their own de facto competence level, compared to their fellow BFSM students who abstained from the voluntary test.

How to handle the BFSM and BFCM students' basic skills in elementary mathematics?

The discovery or recognition during spring 2007 that many of AUC's BFSM and BFCM students struggled with elementary mathematics was an eye-opener. However, the BFSM and BFCM students' poor skills in elementary mathematics are not unique. Numerous studies and tests have found similar challenges at many other Norwegian university colleges,

particularly among teacher, nursing and social education students (Syvertsen 1987; Tønder 2005; Lauvås 2006:100 ff.; Tessem 2007; Hafstad 2008). These students' knowledge level in elementary mathematics – or lack of such – has received considerable attention recently, even if these results almost were to be expected. The Norwegian Mathematical Council's (Norsk Matematikkråd) annual tests have proven beyond doubt that Norwegian students' skills in elementary mathematics have deteriorated significantly since 1984. The students' average test score in 1984 was 72.8 percent. The average test score in 2005 was 48.5 percent (Rasch-Halvorsen and Johnsbråten 2006:37 Table 14). The BFSM and BFCM students' poor skills in elementary mathematics were thus almost to be expected, given the trend of deteriorating skills in elementary mathematics among large groups students.

The Norwegian students' deteriorating skills in elementary mathematics have been well known for years (Ertesvåg 2001; Weldeghebriel 2001; Kluge 2004; Aftenposten 2004), although these facts were largely ignored by politicians and the general public until publication of the 2006 PISA test results (Tessem and Moe 2007; Haug 2007). The Norwegian pupils' performance in reading and science actually deteriorated in the 2006 PISA test, compared to their 2003 PISA test results (Sjøberg 2007). Until publication of the 2006 PISA test results – it was normally persons labelled “old and grumpy” science teachers – who were the ones who wrote letters to the editor complaining about the pupils' and students' deteriorating skills in mathematics. Most Norwegians had until then lived happily in the commonly held delusion that Norwegian primary education produced world class student material. However, after the 2006 PISA test results became publicly known, there were also critics such as Professor Nils Christie, who blamed the PISA tests, rather than the Norwegian education system. Nils Christie characterized the PISA tests as “fraudulent”, because they questioned the Norwegian primary education's aims (NRK 2008). We may like or dislike the PISA tests and the PISA test results, but it is proven beyond reasonable doubt that many Norwegian students struggle with elementary mathematics. Large numbers of such students will most likely be the norm in the years to come in many undergraduate professions-oriented study programmes, such as for instance BFSM and BFCM.

I discussed my personal experiences concerning the BFSM and BFCM students' poor skills in elementary mathematics with fellow students at Oslo University College's course in elementary pedagogy in 2007/2008. The students at this course were all teachers or scholars who taught in nursing, social education, engineering and business administration at university colleges in south-eastern, western and middle Norway. Many of the students at this course in elementary pedagogy had experienced students struggling with elementary mathematics. The problems or chal-

lenges I had stumbled across when teaching Accounting and Managerial Economics at AUC during spring 2007 were in other words rather common, even among students of nursing, social education, engineering, etc. Possible remedies for these problems or challenges were of general interest.

One of the questions after completing the spring 2007 teaching was: Could the new BFSM and BFCM students be handled differently during the academic year 2007–2008, to avoid some of the challenges entailing students with poor basic skills in elementary mathematics? Oslo University College's course in elementary pedagogy provided some clues about how to meet this challenge.

The attempted remedy for new students' poor skills in elementary mathematics

The attempted remedy for the new BFSM and BFCM students' suspected poor skills in elementary mathematics began already in August 2007, immediately after they had been enrolled as students at AUC. Every new student enrolled in AUC's BFSM and BFCM educational programmes fall 2007 was offered a similar voluntary diagnostic test in elementary mathematics like the one that had been used the spring 2007. Even AUC's new students in the Bachelor programme in Public Nutrition (BPN) were asked to participate in this second test. The idea was to use the new BPN students as a benchmark or yardstick for the formal and non-formal competence BFSM and BFCM students. Every new BPN student was a formal competence student. Almost every new BPN student had completed the upper secondary school's most or second most advanced courses in mathematics. The vast majority of AUC's new BPN students had thereby significantly stronger formal qualifications than the majority of new BFSM and BFCM students.

Table 5: The new BPN, BFSM and BFCM students' (N = 53) scores in the August 2007 voluntary diagnostic test in elementary mathematics

	BPN students who took the test (N = 16)		BFSM students who took the test (N = 27)		BFCM students who took the test (N = 10)	
	#	%	#	%	#	%
Average	83	68	68	56	64	52
Median	83	68	70	57	61	50
Maximum	111	91	101	83	103	84
Minimum	46	38	28	23	39	32
Spread	65		73		64	

Table 5 provides an overview of the new BPN, BFSM and BFCM students' raw scores in the August 2007 voluntary diagnostic test. The BPN students' (N = 16) results were somewhat surprising, because their maximum score was only 111 points (91 percent), compared to the new BFSM students' 101 points (83 percent) and the new BFCM students' 103 points (84 percent). The BPN students' minimum score was 46 points (38 percent), compared to the new BFSM students' 28 points (23 percent) and the new BFCM students' 39 points (32 percent). The BPN students' spread, 65 points, was almost equal to the new BFCM students spread on 64 points. But the BPN students' spread was somewhat smaller than the new BFSM students' spread on 73 points. The new BFSM students' spread was considerably smaller than the BFSM students' 88 points spread in the spring 2007 diagnostic test mentioned earlier in this article. The new BFCM students' 64 points spread was somewhat larger than the BFCM students' 47 points spread in the spring 2007 test.^{30 31} However, the new BPN students' average (83) and median (83) scores were significantly higher than the BFSM and BFCM students' averages and median scores.

These results were almost as expected. But the new BPN students' maximum, average and median scores were relatively modest, compared to the new BFSM and BFCM students' scores, given the BPN students' seemingly stronger formal qualifications. Most new BFSM students fall 2007 were formal competence students. Most new BFCM students fall 2007 were non-formal competence students.

³⁰ The BPN students' average score was equal to the median, 83 points (68 percent), according to Table 6. The new BFSM students' average was similarly 68 points (45 percent) compared to 66 points (54 percent) for those BFSM students who took the test during spring 2007. The new BFSM students' median was 70 points (57 percent) compared to 59 points (48 percent) for those BFSM students who took the test during spring 2007. Thus, all new BFSM students who began their studies at AUC from the fall 2007 was at least in theory better qualified in elementary mathematics than their fellow BFSM students who began at AUC fall 2006.

³¹ The new BFCM students' average was 64 points (52 percent), according to Table 5, compared to 74 points (61 percent) for those BFSM students who took the test during spring 2007. The new BFCM students' median was 61 points (50 percent) compared to 72 points (59 percent) for those BFCM students who took the test during spring 2007. The BFCM student who began their studies fall 2006 were in other words at least in theory significantly better qualified in elementary mathematics than the BFCM students who began their studies at AUC fall 2007.

Table 6: The BFSM (N = 27) and BFCM (N = 10) students' raw score in the August 2007 voluntary diagnostic test in elementary mathematics

	Those BFSM and BFCM students who took the test fall 2007 (N = 37)		Formal competence BFSM and BFCM students (N = 25)		Non-formal competence BFSM and BFCM students (N = 12)	
	#	%	#	%	#	%
Average	67	55	71	58	58	48
Median	69	57	73	60	55	45
Maximum	103	84	101	83	103	84
Minimum	28	23	28	23	30	25
Spread	75	–	73	–	73	–

The test results presented in Table 6 revealed that formal competence BFSM and BFCM students (N = 25) performed far better on the average and median in elementary mathematics than their fellow non-formal competence BFSM and BFCM students (N = 12) in the fall 2007 diagnostic test. However, the non-formal competence BFSM and BFCM students' maximum and minimum scores were slightly above the formal competence BFSM and BFCM students' maximum and minimum scores. The spread between maximum and minimum scores were equal for the two categories of students, namely 73 points. The fall 2007 test results were as expected, because here the formal competence students performed significantly better than their fellow non-formal competence students.^{32 33}

³² The new formal competence BFSM students' average score (N = 23) was 71 points (58 percent), compared to the new non-formal competence BFSM students' (N = 4) 51 point (42 percent). The new formal competence BFSM students' maximum and minimum was 101 (83 percent) and 28 points (23 percent) compared to the new non-formal competence BFSM students 64 points (52 percent) and 30 points (25 percent). The new formal competence BFSM students' spread was thus 73 points, compared to the new non-formal competence BFSM students' spread which was only 34 points. The new formal competence BFSM students' median score was 73 points (59 percent). The new non-formal competence BFSM students' median score was 56 points (46 percent).

³³ The average score for all new BFCM students (N = 10) who took the August 2007 test was 64 points (52 percent), and their maximum and minimum scores were 103 (84 percent) and 39 points (32 percent). Their spread was 64 points. Their median score was 61 points (50 percent). The new formal competence BFCM students (N = 2) average and median scores were 74.5 points (61 percent). Their maximum and minimum scores were 78 (64 percent) and 71 points (58 percent). Their spread was thus only 7 points. The new non-formal competence BFCM students (N = 8) who accomplished the August 2007 test was 61 points (50 percent). Their maximum and minimum scores were 103 (84 percent) and 39 points (32 percent). Their median score was 55 points (45 percent). The non-formal competence BFCM students' spread was 64 points, similarly as the spread for all new BFCM students.

Table 7: The BPN students' performance on the voluntary August 2007 diagnostic test converted to marks compared to the BFSM and BFCM students' performance (N = 53)

Mark	BPN students (N = 16)		BFSM students (N = 27)		BFCM students (N = 10)	
	#	%	#	%	#	%
A	0	0	0	0	0	0
B	4	25	4	15	1	10
C	9	56	6	22	2	20
D	1	6	8	30	3	30
E	2	13	6	22	3	30
F	0	0	3	11	1	10
Sum	16	100	27	100	10	100

Table 7 provides a comparative overview of the new BPN, BFSM and BFCM students' performance on the voluntary August 2007 tests converted to marks. This comparison made it evident that new BPN students manage elementary mathematics far better than most new BFSM and BFCM students. However, none of the new students, irrespective of their study programmes or background managed an A in the August 2007 diagnostic tests! 25 percent of the new BPN students managed B, while 15 percent of the new BFSM and only 10 percent of the new BFCM students managed B. 62 percent of the new BPN students managed C or D, while 52 percent of the new BFSM and 50 percent of the new BFCM students managed C or D. 13 percent of the new BPN students managed E or F on the August 2007 diagnostic test. But none of the new BPN students performed at F-level. 33 percent of the new BFSM students and 40 percent of the BFSM students managed E or F on the August 2007 diagnostic test. 11 percent of the new BFSM students and 10 percent of the new BFCM students performed at F-level in the August 2007 diagnostic test. These differences were also as expected, given most new BPN students' fairly strong formal qualifications, compared to many of the new BFSM and BFCM students. However, the BPN students' performance on the diagnostic tests was surprisingly weak given their relatively strong formal competencies. But their performance was clearly in line with the findings from the Norwegian Mathematical Council's annual tests.

Could a voluntary course in elementary mathematics improve the BFSM and BFCM students' exam results in Accounting and Managerial Economics?

The new BFSM and BFCM students' performance in the August 2007 diagnostic tests made it evident that something had to be done. Many of these students' were in urgent need of improved skills in elementary mathematics in order to manage their studies; but how to meet this challenge?

The BFSM students are an odd lot or heterogeneous group in terms of age, academic skills or competencies, socioeconomic status and work experience. Their fellow BFCM students are far more homogeneous, because every BFCM student has a trade certificate either as a chef or a dietary cook. The BFCM students also have work experience from at least one professional kitchen. The BFCM students' are also rather homogeneous concerning age and academic background, or lack thereof. Only a small fraction of the BFCM students have so far been formal competence students. These have usually been among the youngest BFCM students. The future numbers of formal competence BFCM students will most likely increase because of Norway's so-called Reform 94 (R-94). R-94 has made it possible for those who chose vocational secondary school to supplement their vocational training with an extra year at secondary school, and thereby become formal competence students.

The means chosen for improving the new BFSM and BFCM students' skills in elementary mathematics was a series of 5 voluntary afternoon workshops from October 2007 until December 2007. These workshops were combined with a textbook, a set of exercises, and individual and group based homework between each workshop. 25 students signed up in advance for this series of workshops. 10 were from the new BFSM class (among these were 3 non-formal competence students). 8 were from the new BFCM class (among these were 7 non-formal competence students). In addition came 3 new BPN students, 3 second year BFSM students, and 1 third year BFSM student. However, the two new BPN students who actually attended the first math workshop met only once, most likely because the level was very elementary, given their formal qualifications and skills level.

The idea behind this series of math workshops was to target those topics in elementary mathematics with very low average scores in the August 2007 voluntary diagnostic tests. These topics were first and foremost fractions, division, percents and elementary algebra, in other words the same topics where many Norwegian students struggled, as shown by other tests and studies (See for instance Rasch-Halvorsen and Johnsbråten 2006; Sæterøy and Devik 2006; Tønsberg Blad 2006; Nikolaisen 2006). However, the workshop's progress became far slower than planned. It became very soon evident that many of the new BFSM and BFCM students who took part in the workshops had more lacunas in their math knowledge than initially assumed. The aim for this series of workshops was first and foremost to bring as many of the new students as possible up to a level where they were comfortable with elementary mathematics (able to swim), so they could focus on managerial economics during the spring term 2008.

Did this series of workshops produce the desired outcomes? The 8 new BFCM students who signed up attended almost at every workshop. Most of the 10 new BFSM students who signed up also attended. Unfortunately, none of the new BFSM students attended the final workshop due to an exam in another course. The initial plan was to run a voluntary diagnostic post-test on this final workshop, to measure each individual student's progress. Only 7 of the new BFCM students and one third year BFSM student took this second test in December 2007.³⁴ This third-year BFSM student who participated had not been tested prior to the math workshops.

The 6 non-formal BFCM students' average score on this second test in December 2007 was 85 points (70 percent). Their maximum and minimum scores were 103 (84 percent) and 60 points (49 percent). Their median score was 82 points (67 percent). These results were encouraging. The new non-formal BFCM students' average score in August 2007 was 61 points (50 percent). Their maximum and minimum scores in August 2007 were 103 (84 percent) and 39 points (32 percent). Their median score in August 2007 was 55 points (45 percent). It was thereby evident in December 2007 that this series of voluntary workshops combined with the non-formal competence BFCM students' own efforts had improved their skills in elementary mathematics significantly.

Table 8: The non-formal competence BFCM students' (N = 7) results in the August 2007 pre-test compared to their results in the December 2007 post-test

December 2007 Diagnostic post-test	F						
	E						
	D						1
	C				2	1	
	B			1	1	1	
	A						
		A	B	C	D	E	F
August 2007 diagnostic pre-test							

³⁴ The third year BFSM student scored 103 point on this test.

The non-formal competence BFCM students' scores in the August 2007 pre-test and in the December 2007 post-test have been converted to marks. The purpose of this post-test was to measure the students' progress, or lack thereof. Table 8 shows that all non-formal competence BFCM students who took part in the series of workshops, and who took the post-test significantly improved their results compared to their pre-tests. But there is one problem that makes it very difficult to draw firm conclusions. The August 2007 pre-test and the December 2007 post-test were identical. Myhre's diagnostic test is not designed for such use, because this test is only currently available in one version.

This series of workshops in elementary mathematics was upon request from those new BFSM and BFCM students who participated, supplemented with 3 additional voluntary workshops in February 2008. 15 students, 9 BFSM and 6 BFCM, signed up for this second series of workshops. 3 of these BFSM and all of the BFCM students were non-formal competence students. This second series of workshops addressed mathematical topics of particular relevance for the forthcoming course in Accounting and Managerial Economics. This second series of workshops was ended with a voluntary diagnostic test for those BFSM students who missed the December 2007 post-test.

Did this second series of math workshops have any effect? The 5 BFSM students who took the post-test in February 2008, performed significantly better than they did on their August 2007 pre-test. The same would most likely have been the case for the BFCM students, even if they took their post-test already in December 2007. 4 formal and 1 non-formal competence BFSM students took the post-test in February 2008. The average score for these 5 students was 94 points (77 percent), compared to 68 points (56 percent) in the August 2007 pre-test. The maximum and minimum scores were similarly 109 (89 percent) and 77 (63 percent) points, compared to 101 (83 percent) and 28 (23 percent) points in August 2007. The median score was similarly 97 points (80 percent), well above the average, compared to 70 points (57 percent) in August 2007. The spread had thus been reduced to 32 points (26 percent of the maximum possible score) compared to 73 points (60 percent of the maximum possible score) in August 2007.

What about the formal competence BFSM students' results on this February 2008 post-test? The average score for these students (N = 4) in February 2008 was 95 points (78 percent), compared to 71 points (58 percent) in the August 2007 test. The formal competence BFSM students' maximum and minimum score in February 2008 was 109 (89 percent) and 77 points (63 percent), compared to 101 points (83 percent) and 28 points (23 percent) in the August 2007 test. The median was 98 points (80 percent) compared to 73 points (60 percent) in the August 2007 test. The

spread was even here reduced to 32 points (26 percent of the maximum possible score), compared to 73 points (60 percent of the maximum possible score) on the August 2007 pre-test. Even these results indicated significant improvements compared to the voluntary August 2007 diagnostic pre-test. But were those BFSM students who took part in these workshops and other efforts to improve their skills in elementary mathematics representative?

Table 9: The BFSM students' (N = 5) performance in the voluntary August 2007 diagnostic pre-test compared to their performance in the voluntary February 2008 diagnostic post-test

February 2008 diagnostic post-test	F					
	E					
	D				1	
	C			1		
	B		1	1		1
	A					
		A	B	C	D	E
August 2007 diagnostic pre-test						

Table 9 provides an overview of the 5 formal and non-formal competence BFSM students' performance in the August 2007 diagnostic pre-test compared to their performance in the February 2008 post-test. One student performed similarly on the pre-test and the post-test (BB). The other 4 students improved their results significantly, such as shown in Table 9, because their results plot below the diagonal AA-FF. However, it is difficult even here to draw strong and definite conclusions, because the August 2007 pre-tests and the February 2008 post-tests were identical.

Another problem concerning the BFCM students' post-test in December 2007 (N = 7) and the BFSM students' post-test in February 2008 (N = 5), which makes it difficult to draw strong conclusions, is the very small sample of students. But there is no doubt these 8 voluntary math workshops, included a lot of formative assessment of the students during the course of the workshops improved the participants' skills in elementary mathematics. The post-tests indicated these students almost had been brought up to BPN student level!

The proof of the pudding is in the eating

An old English proverb says that “The proof of the pudding is in the eating”. The proof of the pudding in this context was how the new BFSM and BFCM students performed in their spring 2008 exam in Accounting and Managerial Economics.

The spring 2008 course in Accounting and Managerial Economics was somewhat modified, compared to former courses. These modifications were first and foremost based on the experiences from teaching the course during spring 2007, and the BFSM and BFCM students’ exam results spring 2007 as well as tricks learnt during OUC’s 2007/2008 course in elementary pedagogy. The spring 2008 course in Accounting and Managerial Economics was thus modified both structurally and pedagogically.

First of all, the most important structural modification was a slightly expanded curriculum, namely the introduction of some elementary finance. The second structural modification was expanding the Accounting and Managerial Economics exam from 4 to 5 hours. The final structural modification was permitting the use of financial calculators when taking the exam. Financial calculators have been household items since the early 1990s in most other Norwegian university colleges and business schools teaching similar subjects.

The first pedagogical modification was the introduction of a voluntary full-day simulation game (Learning by Doing 2006), to jumpstart the BFSM and BFCM students’ learning of Accounting and Managerial Economics. Groups of BFSM and BFCM students here acted as managerial teams, and played themselves through 4 years of an enterprise’s life. These groups also competed against each other, and were supposed to investigate and experience the economic consequences of their own decisions, because each group had to establish their own investment strategies. The idea behind this simulation game is to provide a taste of business for those students who lack hands-on business and/or work experience.

The second pedagogical modification was the introduction of voluntary weekly exercises in accounting and managerial economics, similar to the mandatory mathematics course at ØUC’s teacher education, as mentioned earlier in this article (Lauvås 2006:100-102). These weekly exercises were designed to encourage the students’ solving of exam related tasks, and thereby facilitate their learning. These weekly exercises were also supposed to provide formative assessments, to further boost the students’ learning of Accounting and Managerial Economics. The weekly exercises were distributed to the students every Thursday afternoon, at the end of the lecture. Each student submitted her or his completed exercises to the teacher on Monday morning. The teacher made notes of those who had completed or attempted to complete their exercises, and dismissed those students who had not submitted their exercises.

The third pedagogical modification introduced was peer-learning or responses from fellow students, in order to increase the amount of formative assessments given to the students. Each student who had accomplished the weekly exercises would then correct one of the other student’s exercises according to the teacher’s answer key. Only those students present in class when the set of exercises were corrected received copies of the teacher’s answer key. Only those students present when the exercises were corrected received the teacher’s comments to the exercises and their answer key.

A fourth pedagogical modification was teaching the students how to make efficient use of the financial calculator which was permitted on the spring 2008 exam in Accounting and Managerial Economics. The BFSM and BFCM students had until then only been permitted to use very simple calculators and interest tables during the exam in Accounting and Managerial Economics.

The final pedagogical modification was the opportunity for each student to make her or his own formula sheet in advance of the exam in Accounting and Managerial Economics. These formula sheets were submitted to the teacher, who approved them and handed them out to the students at the exam. This final measure was supposed to calm the students’ exam nerves, although the exam tasks took into consideration that most students had made their own formula sheets. The exam tasks were therefore designed to test the students’ understanding of fundamental concepts in Accounting and Managerial Economics.

The interesting question is of course, if and how did these measures affect the students’ performance on their exam in Accounting and Managerial Economics?

Table 10: The BFSM students’ (N = 22) marks on their spring 2008 exam in Accounting and Managerial Economics

Mark	BFSM students (N = 22) who took the spring 2008 exam		Formal competence BFSM students (N = 17)		Non-formal competence BFSM students (N = 5)	
	No	%	No	%	No	%
A	0	0	0	0	0	0
B	1	5	1	6	0	0
C	3	14	3	18	0	0
D	3	14	3	18	0	0
E	5	23	3	18	2	40
F	10	45	7	41	3	60

We can see from Table 10 that only 5 percent of all BFSM students who took the spring 2008 exam in Accounting and Managerial Economics achieved excellent (A and B). 28 percent performed acceptably (C and D). 68 percent performed inadequately (E and F). 45 percent of the BFSM students failed (F) their spring 2008 exam in Accounting and Managerial Economics. The formal competence BFSM students' results (N = 17) were very similar to the BFSM students as such. 41 percent of the formal competence BFSM students failed (F) their spring 2008 exam in Accounting and Managerial Economics. The non-formal competence BFSM students did not perform particularly well compared to their fellow formal competence students. 100 percent of the non-formal competence BFSM students performed inadequate (E and F)! 60 percent of the non-formal competence BFSM students failed (F) their spring 2008 exam in Accounting and Managerial Economics!

These results were not encouraging, but very similar to the BFSM students' results in the spring 2007 exam in Accounting and Managerial Economics, when 10 percent performed excellent (A and B), 28 percent performed adequate (C and D) and 63 percent performed inadequate (E and F). 27 percent of the BFSM students failed (F) their spring 2007 exam in Accounting and Managerial Economics. However, the formal competence BFSM students' failure rate 2007 spring 2007 was 22 percent, compared to 41 percent in the spring 2008 exam. The non-formal competence BFSM students' failure rate in the spring 2007 exam was similarly 50 percent, compared to 60 percent in the spring 2008 exam. The major differences between the BFSM students' exam results in 2007 and 2008 were thus no A results in the 2008 exam and a failure rate that increased from 27 to 45 percent. The formal competence students' failure rate increased from 27 to 41 percent. The non-formal competence students' failure rate increased from 50 to 60 percent.

How to explain the BFSM students results in their spring 2008 exam in Accounting and Managerial Economics? The new structural and pedagogical measures introduced during spring 2008 were supposed to improve the students' exam results, but had seemingly not produced the desired outcomes. Were these disappointing results caused by the BFSM students' background and competence level (i.e. science illiteracy), faulty teaching or organizing, or the students' motivation (passivity) and learning strategies, or combinations thereof?

It is still too early to draw any conclusions, because the BFSM students took part in exactly the same lectures as the BFCM students. These lectures were delivered by the same teachers. The BFSM students also did the same voluntary weekly exercises, and had the same exam in Accounting and Managerial Economics as the BFCM students. The BFCM students' results in their spring 2008 exam in Accounting and Managerial

Economics can thus be used as a benchmark or yardstick for the BFSM students' results. The BFCM students' exam results are shown in Table 11.

Table 11: The BFCM students' (N = 9) marks on their spring 2008 exam in Accounting and Managerial Economics

Mark	BFCM students (N = 9) who took the spring 2008 exam		Formal competence BFCM students (N = 2)		Non-formal competence BFCM students (N = 7)	
	No	%	No	%	No	%
A	0	0	0	0	0	0
B	3	33	0	0	3	43
C	1	11	0	0	1	14
D	1	11	1	50	0	0
E	4	44	1	50	3	43
F	0	0	0	0	0	0

A comparison of Table 10 and 11 makes it evident the BFCM students performed far better on their spring 2008 exam in Accounting and Managerial Economics than their fellow BFSM students. This was particularly the case for the non-formal competence BFCM students, who are this study's success story. 33 percent of the BFCM students achieved top marks (A and B). 22 percent performed acceptably (C and D). Only 44 percent of the BFCM students performed inadequately (E and F). But none of the BFCM students failed their spring 2008 exam in Accounting and Managerial Economics, while 40 percent of the BFCM students failed their spring 2007 exam in Accounting and Managerial Economics! 10 percent of the BFCM student performed adequately (D) in the spring 2007 exam, while 90 percent performed inadequately (E and F). Neither one of the formal competence BFCM students failed their spring 2008 exam in Accounting and Managerial Economics. 50 percent of the formal competence BFCM students failed their spring 2007 exam.

The non-formal competence BFCM students achieved the most striking results in the spring 2008 exam in Accounting and Managerial Economics. 43 percent of these students performed excellent (B). 14 percent performed adequately (C) and 43 percent performed inadequately (E). None of the non-formal competence BFCM students failed their spring 2008 exam! 33 percent of the non-formal competence BFCM students failed their spring 2007 exam in Accounting and Managerial Economics.

How to explain these unexpected results?

The question is how to explain the BFSM and BFCM students' very different performance in their spring 2008 exams in Accounting and Managerial Economics. These students attended the same lectures, and were taught, supervised and counselled by the same teachers. They were also offered the same voluntary weekly exercises, etc. They had also exactly the same exam. Were the new teaching methods inefficient or did the new BFCM students' basic skills, motivation, study techniques, etc. differ from the new BFSM students' basic skills, motivation, study techniques, etc.? Were the new BFCM students more motivated, and did the new BFCM students study smarter and harder than their fellow BFSM students?

One attempt at answering these questions is to study the relations between the BFSM and BFCM students' skills in elementary mathematics and their marks in the spring 2008 exam in Accounting and Managerial Economics. The students' scores on the voluntary August 2007 pre-test and the December 2007 and February 2008 post-tests compared to the exam results are here used as proxies for the students' skills in elementary mathematics.

Table 12: The BFSM students' performance on the August 2007 pre-test (N = 19) and the February 2008 post-test (N = 5) compared to their performance on the spring 2008 exam in Accounting and Managerial Economics

	Formal and non-formal competence BFSM students (N = 19)								Formal and non-formal competence BFSM students (N = 5)						
Spring 2008 exam in Accounting and Managerial Economics	F		1	1	3	1	3	Spring 2008 exam in Accounting and Managerial Economics	F		1				
	E		1	1	2				E		1	1			
	D				1	1			D		1				
	C		1	1	1				C						
	B					1			B					1	
	A								A						
		A	B	C	D	E	F			A	B	C	D	E	F
	August 2007 diagnostic pre-test								February 2008 diagnostic post-test						

Table 12 shows the formal and non-formal competence BFSM students' performance on the voluntary August 2007 pre-test (N = 19) and the voluntary February 2008 post-test (N = 5) compared to their performance on the

spring 2008 exam in Accounting and Managerial Economics. Table 12 indicates that most BFSM students had problems utilizing their skills in elementary mathematics in Accounting and Managerial Economics, because most of these students plot above the diagonal AA-FF. Some studies indicate that translating skills or literacies from one area or subject to another are areas of difficulty (Searle 2002; Stevenson 2002), although it is commonly assumed that skills in mathematics improve analytical skills.

The data in Table 12 makes it possible to rule out science illiteracy as an explanation for the poor exam results for at least 15 of the 19 students who took the August 2007 diagnostic post-test and for all the 5 students who took the February 2008 diagnostic post-test. Science illiteracy remains a possible option only for those 4 BFSM students who achieved E or F on the August 2007 pre-test and who failed (F) their spring 2008 exams in Accounting and Managerial Economics. But those BFSM students who performed above the diagonal AA-FF in Table 12 were clearly not able to translate their skills in elementary mathematics into skills in Accounting and Managerial Economics.

Did the 3 BFSM students who chose not to take part in the voluntary diagnostic test in August 2007 perform differently on the spring 2008 exam in Accounting and Managerial Economics compared to those BFSM students who took part in the August 2007 diagnostic test? 2 formal competence and 1 non-formal competence student did not take part in the voluntary diagnostic pre-test in August 2007. These students achieved D, E and F respectively on their spring 2008 exam in Accounting and Managerial Economics. Thus, 33 percent of these 3 students performed adequately (C and D), while 67 percent performed inadequately (E and F). Keep in mind the very small sample, however. The non-formal competence BFSM student who chose not to take the August 2007 pre-test failed (F) the exam (100 percent failure rate). 2 of the 3 BFSM students who chose not to take the voluntary August 2007 pre-test thus performed somewhat better on the spring 2008 exam than those BFSM students who took the voluntary diagnostic test.

What about those BFSM students who participated in the voluntary math workshops from October to December 2007 and in February 2008, and improved their skills in elementary mathematics? Did this series of voluntary workshops make any difference concerning their results in the spring 2008 exam in Accounting and Managerial Economics?

A correspondence analysis between the BFSM students' performance on the August 2007 pre-test (N = 19) converted to marks and their marks in the spring 2008 exam in Accounting and Managerial Economics gave a X^2 value less than the critical value. It was thus not possible to refute H_0 .

There were no statistically significant relationships between the BFSM students' performance on the fall 2007 voluntary diagnostic pre-test in elementary mathematics and their performance on the spring 2008 exam in Accounting and Managerial Economics. A similar correspondence analysis between the BFSM students' marks on the spring 2007 voluntary diagnostic test in elementary mathematics and their marks on their spring 2007 exams in Accounting and Managerial Economics ($N = 17$) gave a X^2 value above the critical value, significant on the 0,1 level. Thus, it was possible to refute H_0 spring 2007. This result strengthened H_{Alt} , namely that there was a statistically significant relationship between the BFSM students' performance on the spring 2007 voluntary diagnostic test in mathematics and their performance on the spring 2007 exam in Accounting and Managerial Economics.

A correspondence analysis between the BFSM students' ($N = 5$) performance on the spring 2008 voluntary post-test in elementary mathematics and their performance on the spring 2008 exam in Accounting and Managerial Economics gave a X^2 value below the critical value. It was thus not possible to refute H_0 . There was no statistically significant relationship between the BFSM students' performance on the diagnostic post-test and their performance on the spring 2008 exam in Accounting and Managerial Economics. However, this conclusion can be a result of the small sample, since the χ^2 test is very sensitive for the sample size.

How to explain the BFSM students' different results in the spring 2007 and spring 2008 exams in Accounting and Managerial Economics? The test results in Table 1 and Table 5 rule out differences between the student classes as an explanation for their differing exam results in Accounting and Managerial Economics, at least concerning the students' skills in elementary mathematics or science literacy. This is because the BFSM students performed very similarly on the spring 2007 and the autumn 2007 diagnostic tests. Thus, the 2006 and 2007 classes of BFSM students were rather similar with regard to skills in elementary mathematics or science literacy.

How to explain why BFSM students who improved their skills in elementary mathematics through participation in the voluntary workshops were unable to utilize their new skills in Accounting and Managerial Economics? This explanation strongly supports the science illiteracy hypothesis. The tendency indicating that improved skills in elementary mathematics did not pay off in Accounting and Managerial Economics was particularly pronounced among the non-formal competence BFSM students. A low general competence level; i.e. below some threshold value may thus create difficulties for the students to grasp and utilize what they learn. And they are clearly not able to transfer their skills or literacies from one subject area to another. This observation may support the science illiteracy hypothesis.

An alternative and supplementary explanation of the various categories BFSM students' strange results after the voluntary workshops in elementary mathematics may be these students' passive approach to learning, compared to the BFCM students. Askerøi's (1999) hypothesis was that a combination of passive teachers and passive students, or passive students only, facilitates surface learning. Passivity may be the case among some BFSM students.

A second alternative and supplementary explanation for the BFSM students' puzzling results after the voluntary workshops in elementary mathematics may be the fact that the BFSM students who began their studies at AUC spring 2007 were a very heterogeneous group in terms of age, motivation, skills and knowledge level. This very heterogeneous group may have complicated cooperation and mutual support among the BFSM students, and thereby reduced the BFSM students' opportunities for learning Accounting and Managerial Economics, compared to the BFCM students, who were a far more homogenous group.

A third alternative and supplementary explanation of the BFSM students' strange results is exam nerves. Many BFSM students claimed they learnt what they were supposed to learn, but some BFSM students indicated that "nerves" and stress significantly reduced their ability to perform properly on the spring 2008 exam in Accounting and Managerial Economics.

A fourth alternative and supplementary explanation is that some BFSM students actually complained about difficulties in properly understanding the exam questions. These complaints came both from ethnic Norwegian and non-ethnic Norwegian BFSM students. Hardly any of the BFCM students mentioned similar complaints, even though one of the BFCM students was not an ethnic Norwegian.

None of these alternative and supplementary explanations rule out the hypothesis about science illiteracy among some of the BFSM students. We also know from the 2003 and 2006 PISA tests that many Norwegian pupils struggle with science, mathematics and reading (Lie 2008). It seems likely that students who struggle with poor reading skills and/or inefficient reading strategies also struggle with abstract subjects such as Accounting and Managerial Economics where reading, interpreting and understanding the exercises and exam questions truly represents approximately 50 percent of the task.

One of this study's major unanswered questions is what proportion of the poor exam results in Accounting and Managerial Economics can be explained by weak reading skills and inefficient reading strategies, and what proportion of the poor exam results in Accounting and Managerial Economics was caused by insufficient skills in Accounting and Manager-

ial Economics? This question is almost a chicken and egg problem. It is reasonably certain, however, that good reading skills and efficient reading strategies are necessary but not sufficient conditions for efficient learning of Accounting and Managerial Economics.

Table 13: The BFCM students' performance in the August 2007 diagnostic pre-test (N = 9) and the February 2008 diagnostic post-test (N = 7) compared to their performance in the spring 2008 exam in Accounting and Managerial Economics

	Formal and non-formal competence BFCM students (N = 9)							Formal and non-formal competence BFCM students (N = 7)						
Spring 2008 exam in Accounting and Managerial Economics	F						Spring 2008 exam in Accounting and Managerial Economics	F						
	E		1		1	1		1	E		1	1	1	
	D			1					D					
	C				1				C			1		
	B			1	1	1			B		2	1		
	A								A					
		A	B	C	D	E	F		A	B	C	D	E	F
	August 2007 diagnostic pre-test							December 2007 diagnostic post-test						

Table 13 provides an overview of the formal and non-formal competence BFCM students' performance in the voluntary August 2007 pre-test (N = 9) and the voluntary December 2007 post-test (N = 7) compared to their performance on the spring 2008 exam in Accounting and Managerial Economics. Table 13 indicates that all of the 9 BFCM students who took the August 2007 pre-test, and all of the 7 BFCM students who took the December 2007 post-test were able to translate their skills in elementary mathematics to skills in Accounting and Managerial Economics. This is because all of the BFCM students who took the diagnostic pre- and post-tests passed their spring 2008 exam in Accounting and Managerial Economics. Those BFCM students who took part in the voluntary math workshops from October to December 2007 and in February 2008 also significantly improved their skills in elementary mathematics.

A similar correspondence analysis between the BFCM students (N = 9) marks in the August 2007 voluntary diagnostic pre-test in elementary mathematics and their marks in the spring 2008 exam in Accounting and Managerial Economics gave a X^2 value below the critical value. It was

thus not possible to refute H_0 . In other words, there was no statistically significant relationship between the BFCM students' performance on the diagnostic pre-test and their performance on the exam in Accounting and Managerial Economics. The same was the case for a similar test comparing the BFCM students' (N = 5) results on the spring 2007 voluntary diagnostic test and their performance on the spring 2007 exam in Accounting and Managerial Economics. These results can be a result of small samples, because the χ^2 test is very sensitive for the sample size.

A correspondence analysis between the BFCM students (N = 7) performance on the fall 2007 voluntary diagnostic post-test in elementary mathematics and their performance in the spring 2008 exam in Accounting and Managerial Economics also yielded a X^2 value below the critical value. It was thus not possible to refute H_0 . There was no statistically significant relationship between the BFCM students' performance on the diagnostic post-test and their performance on the spring 2008 exam in Accounting and Managerial Economics. This conclusion as well may be a result of the small sample.

The voluntary mathematics workshops during the fall 2007 and February 2008 clearly had a positive effect for those BFCM students as such who participated. This result clearly refuted the science illiteracy hypothesis for most BFCM students, because every BFCM student passed the spring 2008 exam in Accounting and Managerial Economics. 40 percent of the BFCM students failed their spring 2007 exam in Accounting and Managerial Economics. Most new BFCM students during spring 2008 were thus able to utilize their improved skills in elementary mathematics for learning Accounting and Managerial Economics. The BFCM students who took part in this series of workshops – and particularly the non-formal competence BFCM students – thereby clearly improved their skills in elementary mathematics above some kind of threshold level that made it possible for these students to utilize their new skills in elementary mathematics for more efficient learning of Accounting and Managerial Economics. An alternative or supplementary but not mutually exclusive explanation is these BFCM students' willingness and/or eagerness to learn and their ability to cooperate, support and motivate each other, and to utilize each others' knowledge for learning Accounting and Managerial Economics. Askerøi's (1999) hypothesis was that combinations of active teachers and active students, or active students only facilitate depth learning. This seems to be the case among AUC's new BFCM students during the academic year 2007/2008.

It is currently very difficult to draw any strong conclusions concerning the effects from introducing a full day simulation of four years in an enterprise's life, introduction of finance calculators, voluntary weekly exercises, increased use of formative assessments through systematic use

of fellow student response (peer-learning), and student-made formula sheets for the exam in the mandatory course in Accounting and Managerial Economics. The effect of one hour extra on the exam has most likely been spent because of the introduction of somewhat more realistic and demanding exercises. But it is demonstrated beyond a reasonable doubt that the series of voluntary workshops in elementary mathematics made a significant difference, particularly for the non-formal competence BFCM students, who are this study's success story.

The question is still why the measures introduced in teaching of Accounting and Managerial Economics during the spring 2008 produced highly different outcomes for the BFSM and BFCM students? These students went through an identical curriculum, were taught and counselled by the same teachers, solved the same weekly exercises and went through identical exams. The major difference between the BFSM and BFCM students, all things being equal, seems to be the BFCM students' willingness and eagerness to learn and cooperate, and their ability to utilize more efficient learning strategies than their fellow BFSM students.

Summary and conclusions

This study about how AUC's formal and non-formal competence BFSM and BFCM students manage Accounting and Managerial Economics, which is one of the BFSM and BFCM students' most difficult obstacles on the road to their bachelor degrees, has demonstrated that AUC's teachers actually manage to teach Accounting and Managerial Economics to both groups of students, those with formal competence and those with non-formal competence. The conclusion of the majority of BFSM and BFCM students concerning learning this subject is actually "Yes we can".

This study has also demonstrated that the measures implemented during the academic year 2007/2008 seem to have had a significant positive effect for most BFCM students in the 2007 class learning Accounting and Managerial Economics, particularly for the non-formal competence BFCM students. However, these means were not equally as successful for all of the 2007 BFSM students. How to explain this puzzle, since these students were taught by the same teachers in the same lectures, did the same weekly exercise sets, and had exactly the same exam?

The most important findings in this study are that non-formal competence BFSM students had higher average score and smaller spread than formal competence BFSM students in the spring 2007 voluntary diagnostic test in elementary mathematics. The non-formal competence BFCM students actually had the highest average score and the smallest spread of all in the spring 2007 voluntary diagnostic test. 73 percent of the BFSM and 60 percent of the BFCM students passed their spring 2007 exams in Accounting and Managerial Economics.

But high scores on the diagnostic test were no guarantee of good marks on the spring 2007 exam in Accounting and Managerial Economics. Further investigation revealed that only a few of the formal competence BFSM students and one of the non-formal competence BFCM students actually were able to utilize their skills in elementary mathematics in Accounting and Managerial Economics during spring 2007.

This puzzle, together with many of the BFSM and BFCM students' disappointing spring 2007 exam results in Accounting and Managerial Economics, became the starting point for how to improve the BFSM and BFCM students' skills in elementary mathematics, in order to improve their science literacy. Improved science literacy was in turn assumed to improve their learning of Accounting and Managerial Economics.

The new BFSM and BFCM students who began their studies at AUC during autumn 2007 were offered the same voluntary diagnostic test in August 2007 that had been used during the spring 2007 for testing the 2006 class of BFSM and BFCM students. Even the new BPN students were offered to take part in this August 2007 test. The BPN students' test results were supposed used as a benchmark or yardstick for the BFSM and BFCM students. Most BPN students had completed the upper secondary education's most or second most advanced courses in mathematics, and were thereby at least in theory better formally qualified than most BFSM and BFCM students. The BPN students' average and median scores were significantly higher than the BFSM and BFCM students' scores; but the BPN students' spread was almost equal to the BFCM students' spread. The non-formal competence BFSM students' fall 2007 test scores were significantly weaker than the non-formal competence BFCM students' test scores.

The BFSM and BFCM students were also invited to participate in a series of workshops in elementary mathematics from October to December 2007 and in February 2008. Most students who took part in these workshops significantly improved their skills in elementary mathematics. Most BFCM students who participated in this series of workshops were able to utilize their new skills in elementary mathematics for learning Accounting and Managerial Economics. However, many of the BFSM students who took part in this series of workshops were unable to utilize their new skills in elementary mathematics in learning Accounting and Managerial Economics. These findings may indicate science illiteracy among some of the BFSM students, particularly among the non-competence BFSM students.

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The spring 2008 course in Accounting and Managerial Economics was modified structurally and pedagogically compared to former courses. Also here, the aim was to improve the BFSM and BFCM students' depth learning and exam results. New measures introduced, among others, were a full day simulation of an enterprise where groups of BFSM and BFCM students made investment decisions and competed against each other, voluntary weekly exercises, increased use of formative assessments through fellow student responses (peer-learning), and introduction of finance calculators. The BFSM students' results in their spring 2008 exam in Accounting and Managerial Economics were similar to the BFSM students' results in the 2007 exam, despite new measures aimed at improving the students' learning. However, the BFCM students' result in their spring 2008 exam in Accounting and Managerial Economics, and particularly the non-formal competence BFCM students' results, improved dramatically. Every BFCM student passed their spring 2008 exam in Accounting and Managerial Economics. 40 percent of the BFCM students failed their 2007 exam in Accounting and Managerial Economics.

Correspondence analysis of the 2006 cohorts of BFSM and BFCM students' performance in the spring 2007 voluntary diagnostic tests and their performance in the spring 2007 exam in Accounting and Managerial Economics, and the 2007 class of BFSM and BFCM students' performance in the voluntary August 2007 pre-test, the December 2007 and February 2008 post-tests and their performance in the spring 2008 exam in Accounting and Managerial Economics, showed statistically significant relationships (0.05) between the total 2006 class of BFSM and BFCM students' performance on the spring 2007 voluntary diagnostic test and their performance on the spring 2007 exam in Accounting and Managerial Economics. The correspondence analysis also identified statistically significant (0.1) relations between the 2006 cohort of BFSM students' performance on the spring 2007 voluntary diagnostic test in elementary mathematics and their performance on the spring 2007 exam in Accounting and Managerial Economics.

But the riddle is still why the 2007 class of BFCM students benefited so richly from the structural and pedagogical measures introduced during the academic year 2007/2008, while the 2007 cohort of BFSM students hardly benefited at all from the same measures? The 2007 cohort BFCM students' skills in elementary mathematics were most likely above, and the 2007 cohort BFSM students' skills most likely below, a threshold value decisive for the students' ability to utilize further skills in elementary mathematics for learning other subjects such as Accounting and Managerial Economics. Add also the 2007 class of BFCM students' motivation and willingness to learn, and their cooperation and learning strategies. The 2007 class of BFSM students were far more heterogeneous con-

cerning age, general skills level and motivation than the 2007 class of BFCM students. The BFSM students were usually less active and less able to cooperate. Most BFSM students were therefore unable to utilize the same learning strategies the BFCM students utilized with great success; learning strategies that seem to have safeguarded deep learning of Accounting and Managerial Economics among most of the 2007 class. These findings may indicate the 2007 class of BFCM students were more motivated and more active than most BFSM students. Highly motivated and active students, all other things being equal, learn better than poorly motivated and passive students.

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Richness in Diversity: The democratising of Knowledge in Higher Education

Içara da Silva Holmesland and Judy Deanne Lundin

At the outset of the projects presented and discussed in this book, the authors aimed at investigating whether the students with informal/non-formal learning had the necessary qualifications that would enable them to successfully follow and complete the educational programmes to which they had been admitted. Earlier experiences of the teaching staff at Akershus University College (AUC) indicated that sound job experience was as much a positive factor as formal education for completing the educational programmes. Therefore, when the institutions of higher education in Norway were allowed to open their doors to students with a background based upon their work and life experiences, the academic staff at AUC was positive to the idea of admitting students based on their non-formal and informal learning. However, there were still uncertainties related to the admission of students that might not have the preconditions for success in higher education due to their lack of formal learning. The trial period that started in the autumn of 2000 would enable the staff to acquire the knowledge about the criteria that were the best indicators of success for these students. In addition, more insights would be gained about how students with diverse backgrounds, i.e., with or without formal learning, managed to complete profession-oriented educational programmes in higher education.

Despite the Norwegian policies being open to equality of opportunities and equity in education (Opheim 2004), many educators have expressed scepticism to the Competence Reform (see Holmesland & Lundin 2009). One well known politician and university educator, Inge Lønning, expressed his concern by stating that students needed to have a clear view of the requirements for succeeding in higher education (Lønning 2001). Thus, there was a hesitation about the aims of the Competence Reform being realistic or not. It was also wondered whether different pedagogical measures would be required to meet the needs of students having so different backgrounds but being integrated in the same groups. Finally, the main question that was frequently posed related to whether the students with no formal qualifications would be able to succeed in completing a higher educational programme. Would this reform create false expectations among adult students?

There was a high degree of curiosity about the outcomes of the implementation of the Competence Reform at AUC (Holmesland & Lundin 2009; Risan 2009; Sortland 2009). They decided to start the projects with no *a priori theory*, but anchored on a *grounded theory* perspective (Glaser & Strauss, 1967). The researchers hoped to develop their understanding about different paths to higher education beyond those provided by the formal learning system. Therefore, it was necessary to follow the students during their attendance of the educational programmes and, if possible, add information after their return to working life.

Three main questions were raised by the researchers at the start of the projects. The inquiries focused in general on how the students with formal and non-formal learning would face the challenges of higher education, how the educational programmes would best meet their needs, and whether non-formal/informal learning was a reliable criterion for selecting students for admittance to the profession-oriented educational programmes at AUC.

The specific purpose of Boge's study (2009) was to investigate whether formal and non-formal/informal learning students in the FSM and ICM programmes differed significantly in terms of exam results in Accounting and Managerial Economics. This purpose was related to results of studies by (Lundin & Risan, 2009) that pointed out the difficulties of FSM and ICM students in this programme area. Boge's study also investigated whether measures taken to reinforce the BFSM and BICM students' skills in elementary mathematics, i.e. their science literacy, improved their exam results in Accounting and Managerial Economics. Another purpose of Boge's study was to find out whether structural and pedagogical reforms aimed at improving their learning made any difference concerning students' performance on their exams in Accounting and Managerial Economics.

The various questions are discussed next across the projects and according to their results.

How did students admitted on the basis of formal and non-formal/informal learning face the challenges of higher education?

The Facility and Service Management (FSM), Institutional Catering Management (ICM) and Nursing programmes (Risan 2009; Lundin 2009; Boge 2009; Sortland 2009) experienced that non-formal/informal learning students succeeded in their exams just as well as formal learning students. The students enrolled in these programmes had decided to apply for admission after having worked for a few years and based on the desire for more theoretical knowledge in their professions. They were very conscious about their choice and indicated they were highly motivated to attend the educational programmes. Students with formal learning were also motivated to attend the educational programmes, however they were a bit younger and more uncertain about themselves and the choice made. This was inferred by the researchers as one important reason for a lower percentage of students with formal learning completing the education in nursing.

Risan (2009) observed that a mix of students with formal and non-formal/informal learning background was positive, because the students could complement each other's knowledge. Effective group work has as a prerequisite that one has learnt cooperation and conflict solving. Lengthy experience from working life very likely provided the students with non-formal learning with a solid foundation. They also mentioned that they enjoyed group work and that it was a useful form of study. In general it appeared that students with non-formal learning background thrived well in the social climate of student life. His data from the interviews show that non-formal competence establishes a sound basis for subjects such as work psychology, organisation, management and dietary foods. In these areas one can apply prior experience from working life and adulthood.

Risan's (2009) data show that non-formal competence provided a sufficient foundation for completing Institutional Catering Management. The transition from working life to the student role appears to have been difficult, but these students were able to draw on their background in several disciplines. Based on his data, it does not appear that non-formal learning background should necessitate any changes in order for students to master the study programme. It appears, moreover, that the students themselves manage to adjust to the study programme on a par with their peers having formal learning competence and that they enjoy many advantages from their backgrounds, both during their studies and afterwards in working life.

Boge (2009) experienced that there were hardly any noticeable differ-

ences between the formal learning and non-formal learning students relating to the upper secondary school syllabus in elementary mathematics, which was important for their performance in Accounting and Managerial Economics.

Individual student's motivation and learning strategy

Individual student's motivation and learning strategies seemed to be equally important to both groups of students, factors that are often associated with the way in which they are received at the study site.

In FSM and ICM (Lundin 2009; Risan 2009), the students with non-formal/informal learning, although more certain about their choice, seemed to have less self-confidence about their ability to fulfil these programmes. One of the reasons for such low confidence was perhaps the fact that some of the students with non-formal learning had been away from the school environment for more than 15 years. These students also lacked study routines and methods for extracting knowledge from reading material. Another difficulty pointed out was related to their uncertainties about how to express ideas in a clear written form. However, their work life seemed to have inculcated a very strong sense of self discipline, task accomplishment and effective use of the time. In addition, they had a deep understanding of central concepts regarding important tasks in their profession. These characteristics became very important for facing the new challenges and working toward the completion of a higher educational programme. In addition, students with formal learning also made the point that their participation in group projects was very important. These students expressed that having more mature people with broad work experience in the groups was very positive for fulfilling group tasks. Being older and having family responsibilities were perhaps two of the main reasons for non-formal/informal learning students' concern about optimal use of the time. Therefore they required all group members to meet at the agreed times and were efficient in discussing matters and making decisions. The students with formal learning praised the participation of mature adults with lengthy work experience, which they felt they lacked themselves.

Sortland (2009) found that both student groups were motivated for the study programme, but that their motivation varied throughout the entire study period. In general, the students with non-formal learning expressed a somewhat higher and more even motivation than students with formal competence did. From these results, it is inferred that motivation is a strong factor for the non-formal/informal learning students facing the challenges of higher education. Practical experience seemed an important component of students' motivation, however it was perceived differently by formal and non-formal/informal learning students, especially in the first year of their studies. While formal learning students perceived prac-

tise as "work", non-formal/informal learning students had a different perception of practise and found it was too long. They preferred to have more teaching and theory associated with their practise period. Thus, in the nursing programme, it seems that non-formal/informal learning students feel that the practicum period can support them in facing the challenges of higher education by increasing their theoretical knowledge and, concurrently, preparing them for their professional life (Sortland 2009).

Boge (2009) found that formal learning and non-formal learning students' strategies differed somewhat, and that BFCM students often relied on more cooperative learning strategies than their fellow BFSM students. Many of the BFCM students who relied on the cooperative learning strategies achieved depth learning in accounting and managerial economics.

How can profession-oriented educational programs that enrol students with both formal and informal/non-formal learning best meet their needs?

Among non-formal learning students in each of the programmes similarities were found concerning the age of the students and the explicit wish to acquire more theoretical knowledge. However, the programmes were quite different with regard to the inclusion of practise. In the FSM and FCM programmes, practical experiences were limited to visits to enterprises and guest lecturers from different companies. These non-formal learning students had many years of experience from working life in their professions. Among ICM students, according to Boge (2009), all of them had trade certificates either in institutional catering or as kitchen chefs. In addition, the laboratory sessions provided opportunities for practical activities for the FSM and ICM students with a specific focus on theory development.

In nursing, many of the non-formal learning students had previously worked in the health sector. Therefore, their experiences were quite relevant for their educational practicum period. Being older and having very clear motives for studying, the majority of the non-formal learning students were firmly motivated to attend the programmes from the beginning. The percentage of nursing students who completed the study is higher among those with non-formal competence than among students with formal learning (Sortland 2009).

The students with formal learning seemed to be more unstable in their preferences, and perhaps more uncertain about their choice of an educational programme aimed at a profession. This might have been one of the main reasons for their higher dropout rate and their unstable motivation during the programme's practicum period. This can be illustrated by Sortland's (2009) results showing that formal learning students' perception is

that teaching is planned and aimed at students who already have relevant experience from working in the health sector as auxiliary nurses. Sortland claims that AUC has a potential for improvement in terms of adapting the study programme for students who come directly out of upper secondary school and do not have any relevant work experience.

Nurses in both background categories (Sortland 2009) thought that it was accepted to a negligible degree that they studied theory while they were doing practicum in the field. The university college and practicum sites must therefore collaborate to a greater extent on the quality of the practical studies and adapt the programme so that students can study relevant theory and find relevant research at the practicum site. The students possess varying levels of ability and therefore one should place greater emphasis on developing individualised work plans than is currently being done.

She concludes that AUC must to a greater extent offer students with auxiliary nurse background more challenging practicum sites and be more flexible in opening up for a broader range of options. In consultation with the students, individualised plans should be designed whenever students have lengthy practical experience in a practicum site. Eight weeks can be a very long time to spend in a practicum site where no effort is made to build in new occupational challenges. Perhaps the students would have benefited more by spending some of the weeks to improve their writing, learn to associate theory to practise and to document practical knowledge that non-formal learning students already possess.

One of the very interesting findings in the nursing programme (Sortland 2009) was that students with non-formal learning who had previously experienced learning in the workplace spent on the average more hours reading than the formal learning students both before and during their practicum period. They also wished to have more theory taught in the practicum site. These results underscore some of the issues discussed by Stevenson (2002) and Searle (2002). While Stevenson points out the importance of *cultural situatedness* of activity, i.e., how knowing is derived from socio-cultural activity and its historical construction (Stevenson 2002), Searle (2002) draws attention to the learning that takes place through practice. She refers to results of her study which suggest that actual workplace practises involve socially constructed literacies that depend on the user's ability to make judgments on how to use the text or obtain information from within the text for site specific purposes.

Might these be reasons behind the motivation of students who expressed a desire for more teaching, interpreted in this case as the desire to learn more theory during practise in the hospitals?

Boge (2009) found that didactic and pedagogical measures implemented for improving the non-formal learning students' learning and science literacy, also were beneficial to the formal learning students.

What role did literacy play in the reported results?

The importance of having sound mastery of the literacies in the fields of science and language is undeniable, whether applied to formal or non-formal learning students. There were strong indications in the interviews carried out with FSM and ICM students that those who enjoyed reading were able to overcome the difficulties they encountered when reading texts in financial and managerial economics. The ability to grasp the content of written texts may compensate for some lack of science literacy, such as basic mathematics for financial and managerial economics (Boge 2009). Such a grasp can also compensate for the lack of basic knowledge in chemistry provided the teachers take this weakness into consideration in their teaching methods (Lundin 2009; Boge 2009). Both authors emphasise that the teachers' professional skills, their motivation and teaching methods are important determinants of students' success.

One of the inferences made by the researchers who conducted the interviews with the FSM and ICM students, was that an interest in reading, not necessarily reading books strictly related to the subject area, but literature in general, provided a solid background for success in all modules, including Financial and Managerial Economics. It seems that the habit of reading, which supports language development and conceptual cognition, is an important literacy asset for learning, regardless of the area of knowledge, be it at school or in the workplace.

However, in spite of so many positive results, one should not be so naïve as to spread the word that students attending courses or modules in higher education requiring science literacy can base their knowledge on work experience alone. It was no bed of roses for either group of students. All of them struggled in some subjects. Both formal and non-formal learning students indicated that they wanted to increase their *science literacy*, as was pointed out also by the nursing students (Sortland 2009).

This was also the case for BFSM and BFCM students (Boge 2009). BFSM and BFCM students with formal and non-formal competence alike struggled with chemistry and managerial economics, but many of the students with non-formal competence struggled more with these subjects than those with formal competence, although those with non-formal competence who were able to crack the learning code did fairly well in Managerial Economics. One such measure for cracking the learning code and improving the BFSM and BFCM students' science literacy was the offering of a voluntary course in elementary mathematics for all newly enrolled BFSM and BFCM students during autumn 2007 and winter

2008. Many of the non-formal competence BFCM students who completed this course significantly improved their skills in elementary mathematics. These non-formal competence students were later able to utilize their new skills in mathematics when learning managerial economics. Every new BFCM student passed the spring 2008 exams in managerial economics, while 40 percent of the new BFCM students failed this exam in spring 2007. However, the BFSM students who took part in this voluntary course in elementary mathematics were not as successful as their fellow BFCM students on the spring 2008 exam in managerial economics. One explanation for this riddle may be that some of the students' skills level in elementary mathematics was below a given threshold value, while most BFCM students' skills in elementary mathematics were above the same threshold value, a factor that was decisive for these students' ability to carry over skills in elementary mathematics to learning other subjects. Another explanation seems to be that many of the BFCM students were better motivated to learn than some of the BFSM students. The BFCM students also utilized different collaborative methods and learning strategies than most BFSM students. The BFCM students collaborated intensively after the lectures, and every BFCM student was included in this community of learning.

The students considered theoretical knowledge to be very important, irrespective of their background. This is confirmed by Risan (2009) who points out that despite previous work experiences as leaders in organisations, the students in ICM had to work hard to compensate for their lack of formal learning in some areas. Concurrently, they were very eager to acquire more formal knowledge in leadership and organisational psychology. Boge (2009), shows that science literacy is also important for developing and furthering the students' understanding of abstract concepts.

Was the non-formal learning a reliable selection criterion for predicting success in higher education and their later performance in work life?

Last but not least, one may be very curious concerning whether or not non-formal/informal learning background could be an indicator of success for adult students who had many years of work experience. Results of the follow-up study, briefly highlighted below, support the contention that non-formal learning was a reliable criterion for predicting success during the study and later in the working life.

Lundin (2009) found that most of her graduates had jobs with multiple responsibilities and therefore possessive eclectic skills and are capable of working in a number of interrelated situations. FSM and ICM graduates

have reported that they have been responsible for budgets, personnel, catering services, nutrition, quality assurance, leadership and management. In addition, they have also been responsible for the harmony between their job requirements and economic constraints.

Risan's (2009) results, although based on a small sample of students, clearly states that students with non-formal competence one year after graduation dared to venture into challenging positions of employment. In the interviews, they also state that they have experienced strong personal development during the year since graduation and they have an optimistic outlook on the future. The candidates with formal competence have cautiously begun working in positions with limited or non-existent management responsibility. Although they also state that they have developed personally during the previous year, they are more modest in their statements. This may be due to the fact that they have chosen positions for which they are overqualified in terms of the education they completed. They state that they feel insecure and that they need more experience before they eventually accept a managerial position for which they possess the competence to hold, based on the education they have completed.

All in all, Risan (2009) concludes that FCM non-formal/informal learning students achieved better results in the project exams than formal learning students and achieved equally well on the 48-hour take-home exam.

Sortland (2009) reports, based on empirical material, that there was no difference in the two groups caused by any one form of examination being used in the learning process as opposed to any other exam form. Grade C was the average mark for both student groups. The examination result in sociology had one discrepancy that clearly stood out: the average mark for students with formal competence was B, and the average mark for students with non-formal learning background was D. One explanation may be that students with non-formal learning perceived social studies as the subject having least relevance to their nursing studies, and thus it was not weighted in the same way as for example pathology. Aside from general nursing exam I which tests students in basic nursing, there was no pronounced difference in the failure rate between the two groups. The lower failure rate on the general nursing exam I among students with non-formal learning background may be explained by the fact that the students had prior knowledge of the subject area.

As pointed out by Sortland (2009) both student groups experienced that they mastered practical tasks better than theoretical tasks while they were in practicum, although mastering competence was greater among students with non-formal learning background. Generally students with formal learning felt they mastered theoretical tasks better than did the students with non-formal/informal learning. During the course of the study pro-

gramme, students with non-formal learning background mastered theoretical tasks increasingly better.

A final statement by Sortland (2009) summarising the results in nursing education can be extended to all non-formal/informal learning students mentioned in this book:

The study shows that there is no significant difference between the students with and without formal learning, and the students with non-formal/informal learning master the educational programme in nursing at the same level as the students with formal learning. To be an adult student with relevant work experience can be an advantage in several areas during the educational programme. These students are familiar with the practice and can use fewer resources for acquiring practical skills.

Concluding remarks

Results of the studies conducted in AUC's educational programmes in three professional areas, underscore the importance of teachers' mastery of didactics for adult learners. These findings seem to be in agreement with the concepts for adult learning proposed by some authors (Lindeman, 1961; Knowles, 1990; Knowles et al., 1998) who recommend that instruction for adults requires teachers to assume the role of learning facilitator and to focus more on the process and less on the content being taught. It was inferred from the studies that the academic staff at Akershus University College carried out their teaching duties as facilitators of learning. Was this an important reason for the success of non-formal/informal learning students?

Teaching requires a good understanding of students with many more variations in learning aptitude than are explicitly discussed in the articles of this book. The teacher's own competence in the subject and in ways to properly design learning activities will always and inevitably affect the learning outcomes.

Implications emerge showing that central teaching methods in the cited vocational studies at AUC comply with important principles of adult education. Via laboratory exercises, practicum, group and project work, role-play and simulation of authentic challenges in working life, students are given opportunities to differentiate their own learning in pact with their own individual aptitudes. In addition to facilitating the study of subject-related theory and assimilation of lecture presentations, such learning activities also activate and reinforce professional terminology, reflection about one's own learning and application of skills that are basic to liter-

acy (reading, writing and calculation). Through stimulation via varied teaching methods, partially individualised for some of the members of the learning group, students are given the additional opportunity to learn to be efficient students.

Students with non-formal learning background met great literacy challenges in subjects such as calculation, mathematics, economics and chemistry, and challenges were equally as great to complete the theoretical syllabus as well as to use and understand foreign words and phrases or to write project reports and examination papers. Various pedagogical measures were required for both groups, as we have seen in the foregoing articles. Students with non-formal/informal competence had to work harder to get through the first year of study, and this initial year also separated those who either failed to master literacy challenges or lacked sufficient motivation from those who continued and completed the study programme. In the final analysis, the drop-out rate was lowest among students with non-formal/informal learning background.

It is in the follow-up phases that the final results emerge for those who had to struggle extra hard: the students with non-formal competence fared very well, and in some respects better than their peers with formal competence, both on the final exam and in working life one year after graduation.

A related question that the researchers posed referred to the validity of the selection process carried out at the educational institution. There were certain apprehensions that a selection made by the staff might be biased. The degree of success among students with non-formal/informal learning in all of the programmes indicates that the selection process at Akershus University College was highly valid. It was quite probably no less valid than the selection performed by the formal system of admission to higher education, which is a system based mainly on the points acquired by students during upper secondary education in Norway. These results suggest that qualitative information provided by the students regarding their motivations and interests adds relevant information for the selection process. However, one must be cautious in interpreting the positive results of these studies. Having a good theoretical background in science, languages and other types of disciplines is irreplaceably valuable in many types of education.

At this point the researchers involved in the projects wish to draw attention to the fact that the Competence Reform has become more accepted since its implementation in the year 2000.

The results presented here refer to three profession-oriented studies offered at Akershus University College. The findings were congruent in regard to the students' performance being independent of their background. A total of 267 students participated in the study. Out of the total, 63 (ca.30%) were non-formal/informal learning students and 204 had a formal learning background. However, despite the positive results among non-formal/informal learning students one has to be careful about generalising the results to other types of education or even to other institutions of higher education. Such generalisation might be problematical. Therefore more research is needed about the performance of non-formal/informal learning students attending other types of academic programmes in other institutions of higher education.

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Kjersti Sortland is associate professor in nursing at Akershus University College (AUC), Norway. She has been teaching in the Bachelor programme in Nursing and has been responsible for several years for part-time students in the nursing programme. A large number of these students were admitted to the programme based on non-formal/informal competence and in this respect Kjersti Sortland has conducted an evaluative study focusing on learning experiences among nursing students with non-formal learning background and students with formal learning competence.

Hans Risan is associate professor at Akershus University College. He teaches Work- and Leadership Psychology and Human Resource Management in the bachelor programmes in Service and Facility Management and in Food and Catering Management. His research interest is the building of the relationship between the leader and the individual employee (dyads).