The relationship among learning outcome measures used in higher education

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Abstract

Although grades are still considered important signifiers of graduates' quality, greater attention has been paid to other measures of learning outcomes in higher education. This shift in attention is attributed to an increased focus on study quality, employability, quality development and accountability. This paper examines how grades relate to different measures of self-reported learning outcomes in engineering, health programmes and education programmes. Longitudinal data from national surveys in Norway are analysed in combination with data from public registers. Self-reported learning outcomes are related to student engagement and factors indicative of effective educational practices, while grades are related more to student background characteristics. Self-reported learning outcomes therefore measure individual gain or value added, using the personal starting point as a reference In this regard, this paper argues that it is important to critically discuss what kind of measures should be used as learning outcomes.

Keywords: learning outcomes; professions; measurement; grades; commitment

The relationship among learning outcome measures used in higher education

Higher education quality assurance has moved from an input-oriented focus on higher education towards a greater emphasis on accountability, outcomes and results (Ball, 2009; Stensaker & Sweetman, 2014). Many processes, such as the introduction of the European Qualifications Framework for Lifelong Learning, the Bologna Process, as well as other initiatives by the European Union (EU) and the Organisation for Economic Co-operation and Development (OECD), have reinforced the outcome orientation. These developments intend (among others) to increase the relevance and work-life orientation of the study programmes and to provide more knowledge about the level of competence that the graduates have actually obtained. Thus, this article aims to explore the strengths and weaknesses of various learning outcome measures. Rather than examining the validity and reliability of a single instrument, this paper enquires about the extent to which different instruments measure different or similar aspects of learning outcomes.

There have been many discussions on what learning outcomes are and how they should be defined and operationalised (Pröitz, 2010). Scholars contend that a 'measurement problem' (Stensaker & Sweetman, 2014) exists, which refers to the challenge of establishing reliable and valid constructs. The political shifts have opened up the development of different approaches to measuring outcomes. The development of different measures has also undergone a marketisation process, referred to as the 'learning outcomes race' (Douglass *et al*., 2012). In a situation where different actors and organisations present various designs on how learning outcomes should be approached in relation to higher education, it is important to gain more knowledge about what different approaches measure. Moreover, the research literature on the measurement of learning outcomes in higher education also seems divided in different camps. Proponents of standardised and more objective measures argue for the higher quality of their approach compared with self-reported measures and *vice versa* (Klein *et al*., 2005, 2007), with little acknowledgement of their adversaries' arguments. In another line of research, it has been discussed whether the focus on outcomes has potentially negative consequences on the development of higher education itself (Cort, 2010; Allais, 2014). Thus, there is a need for empirical research to nuance and combine the contributions made from different approaches to learning outcomes in higher education.

The data analysed in this article are from a broad student survey in Norwegian higher education, with information on student self-reported learning outcomes and professional commitment. Additionally, this paper includes information from national public registers, such as average grades upon graduation and average grades from upper secondary school. It also includes survey information on factors that have been singled out as important for student outcomes, such as the students' engagement, assessment of study quality and social backgrounds. To include potential variations in the relationships among different professional fields, this study uses data from three fields of education; teaching (student teachers at upper secondary and preschool levels), health (nursing, physiotherapy and occupational therapy students) and engineering.

Different approaches to measurement of outcomes

Traditionally and within theoretical frameworks, such as the human capital tradition (Becker, 1964), grades have been viewed as adequate measurements of quality and learning outcomes. In the human capital theory, it has been argued that workers with higher grades show on average higher productivity than workers with lower grades. Nevertheless, there are many well-known problems with grades as measurements of graduates' competence and proficiency (Yorke, 2009; Caspersen, Smeby and Aamodt, 2017). Grades are difficult to compare among institutions, as standards tend to vary among institutions (and programmes). Moreover, grades measure only (or at least mainly) theoretical mastery, not practical competence; grades are argued to signal only students' general ability to succeed in higher education (Weiss, 1995). Finally, grades are highly correlated to social background (Karabel & Halsey, 1977).

Thus, a great deal of effort has been put into the development of broader measures than grades: a process that has been reinforced by an emphasis on employability and a tendency to perceive all higher education programmes as providers of 'higher vocational education' (Billett, 2009). Self-reported measures have been widely used in research on student learning, as well as a basis for indicators of study quality and student development. Self-reported measures typically aim to assess discipline-specific knowledge, as well as more generic competence and skills. Their low cost and ease of use through electronically administered surveys have made self-assessed measurements popular among all kinds of stakeholders in higher education. The versatility and availability has also paved the way for a diverse range of operationalisations. An alternative approach has been to assess students' problem-solving and generic skills through open-ended questions, rubrics and standardised tests (see Caspersen *et al*., 2017 for an overview). These kinds of test-based measures are not examined further in this article. Even though self-reported measures have been criticised for their potentially dubious validity and standardised, objective learning measures have been advocated (Klein *et al*., 2005, 2007), it

is also argued that surveys on student self-reported outcomes offer valuable and nuanced alternatives in understanding and identifying learning outcomes (Douglass *et al*., 2012). Given the diverse approaches used in research on learning outcomes, it is important to shed more light on the relations between grades and learning outcomes to find fruitful paths forward. This concern has also been voiced by authors from the different research traditions: 'Ideally, assessment of learning outcomes should go beyond…direct measures of learning' (Klein *et al*., 2007, p. 418) This article empirically examines the relationship between learning outcomes measures often used interchangeably, contributing both to the ongoing debate about measurement, but also to the practical use of learning outcome measures in higher education.

Self-reported learning outcome measures often aim to include disciplinary knowledge, generic competence and skills. However, professional education can be argued as being even broader in scope. An important factor is the socialisation into the values and ethos of the profession (Freidson, 2001). To bring the discussion further, we also include an affective outcome such as professional commitment in our empirical study. Thus, professional commitment (Porter *et al*., 1974), understood as the strength of an individual's identification with and involvement in a particular profession, is also an essential outcome for professional graduates. Several studies have shown that professional commitment is a significant predictor of involvement in managerial and technical decision making in organisations (Somech & Bogler, 2002), as well as of turnover intentions in the health sector (Blau & Lunz, 1998; Blau, 2000; Lu *et al*., 2002). This study therefore includes students' professional commitment upon graduation as a learning outcome variable and aim to analyse the relationships among the different outcome factors. Moreover, to explore potential differences among them, this study examines how well-known antecedents affect the different outcome measures.

The remainder of this paper is organised as follows. The next section briefly reviews the literature on factors affecting the different kinds of learning outcomes. It subsequently examines the extent to which this study's learning outcome variables are correlated. Then, based on the literature, it investigates which factors contribute positively or negatively to students' grades, self-reported learning outcomes and professional commitment, before the relationship among the different measures is discussed.

Factors affecting learning outcomes in the professions

Deriving from different traditions many scholars have contributed insights on what factors affect learning outcomes and grades. Astin's (1970a, 1970b, 1991) input-environment-output model of college impact and Tinto's (1993) more sociological approach, which emphasises academic and social integration as antecedents of decisions about departure, are classical contributions in this field. Building on these contributions, other researchers (Klein *et al*., 2005; Carini *et al*., 2006; Harvey, Drew and Smith, 2006; Kuh *et al*., 2008) have analysed the outcomes of student engagement on different variables, such as grades and persistence in continuing higher education (Kuh *et al*., 2008), mental health (Ambler, 2006) and perceived gains in learning and satisfaction (Belcheir, 2001). Their findings have had a large impact on research on student engagement and learning (albeit with some criticism, see, for example, Olivas, 2011; Porter, 2011; Macfarlane & Tomlinson, 2017). Five factors have been singled out as important for student success, as indicated in positive outcomes (Kuh *et al*., 2007, 2008): (a) structural characteristics of institutions (for example, mission, size and selectivity); (b) interactions with faculty members and peers; (c) student perceptions of the learning environment; (d) the quality of the effort that students devote to educationally purposeful activities; and (e) students' background characteristics.

Common criticisms of professional education are that the programmes are fragmented and that classroom teaching is often insufficiently related to students' experiences during placement and future professional practice (Schön, 1987; Benner *et al*., 2010). Students' perceived sense of coherence is therefore vital for their learning outcomes (Grossman *et al*., 2008) and is thus an essential dimension of the structural characteristics of institutions. Several studies indicate that students' development of meaningful relationships and their sense of coherence between classroom teaching and professional practice are positively related to their learning outcomes (Smeby & Heggen, 2014), as well as dedication to and identification with the profession (Heggen & Terum, 2013).

In this article, variables operationalising the five factors used by Kuh *et al.* (2007, 2008) are included. It also includes grades upon enrolment as constituting a dimension of students' background characteristics to control for the candidates' differences in ability. By examining how these different independent variables relate to grades and the different self-reported learning outcome measures included, this paper aims to shed light on whether the various independent variables affect the different outcomes in the same way. Otherwise, the opposite finding supports the assumption that the outcome variables measure different aspects of student learning outcomes.

Data and methods

This study's data are obtained from a longitudinal survey of Norwegian students (StudData) in different professions and fields (education: student teachers at upper secondary and preschool levels, n = 368; health: nursing, physiotherapy and occupational therapy students, n = 419; and engineering: different bachelor programmes, n = 282 students) from different Norwegian university colleges. The respondents represent a national sample of university college graduates. The surveys were conducted at two points in time: at the end of their first year of studies (spring 2005) and at the end of their studies (spring 2007). The somewhat old data can be explained with the time it takes to obtain approval for appending data from public registers, as well as the inclusion of labour market outcomes in the data file (not used in this article). The data on the students' dedication to their choice of academic major are based on the questions from the first survey, whereas data on the students' engagement and study strategies (among other things) are based on the questions from the second survey. At the end of their studies, the students were also asked to assess their own learning outcomes in different dimensions and to respond to questions on professional commitment. Information on each student's grades from upper secondary school and the initial professional education programme was gathered from national registers and then appended to the survey information. The dependent and the independent variables used in the regression analyses are presented in the following two subsections and descriptive statistics are included in Appendix 1.

Dependent variables

The three dependent measures are grades, self-reported learning outcomes and professional commitment. Self-reported learning outcomes are divided into three kinds: general competence, knowledge and skills. These are the same dimensions used in the Norwegian Qualifications Framework for Lifelong Learning, as well as the European Qualifications Framework for Lifelong Learning.

General competence consists of the mean scores on the response categories, ranging from 1 ('did not acquire this type of competence at all') to 5 ('acquired this type of competence to a very high degree'), in five dimensions: acquired ability to reflect on and evaluate one's own work, acquired ability to collaborate with others, acquired ability to take initiative, leadership abilities and acquired ability to take responsibility and make decisions.

Knowledge comprises the mean scores on the statements regarding whether the respondent has acquired: theoretical knowledge; general knowledge; work-specific knowledge; knowledge on planning and organising; and insight into rules and regulations.

Skills consist of the mean scores on the ability to develop practical skills, perceived acquisition of the ability to generate new ideas, the ability to communicate orally with others and the ability to communicate in written form with others.

The measure of professional commitment is based on the work undertaken by Hall (1968) and later expanded on by other scholars studying professional commitment (Mastekaasa, 2009). This measure consists of seven items that address the respondent's affective commitment to his or her profession. Some examples include 'I regularly read magazines that particularly address (the respondent's profession)' and 'There is no question about my membership in an organisation that works for (the respondent's profession) interests'. The items range from 1 ('totally disagree') to 5 ('totally agree').

Grades upon graduation are provided by the Common Student System, which is the administration system for all higher education institutions in Norway. The data contain information on every course taken by an individual student. Each student's average score across subjects has been calculated and used as a dependent variable. The grades range from 1 (an average grade of E) to 5 (an average grade of A).

It should be noted that the alpha values for knowledge and professional commitment are lower than 0.6 for engineers. Thus, the factor structure does not fit this group as well as the others and the results should be interpreted with some caution.

Independent variables

The independent variables can be divided into five types, similar to the independent variables used by Kuh *et al*. (2007, 2008): (a) structural characteristics of the institutions; (b) interactions with faculty members and peers; (c) student perceptions of the learning environment; (d) the quality of student effort; and (e) students' background characteristics.

The independent variable perceived coherence is used to measure the (a) structural characteristics of the institutions. Perceived coherence is a latent construct that consists of two items. The two items describe whether the connection between theory and practice and between studies and future work tasks are emphasised in the courses. Thus, the construct measures the coherence between classroom teaching and professional practice. The measure ranges from 1 ('disagree') to 7 ('agree').

Study strategy is used to measure (b) interactions with faculty members and peers. It is a nine-item index measuring the range of student interactivity, that is, from a passive student (a student who focuses only on examinations and does not read beyond the content of the curriculum) to an active student (a student who consults academic staff outside of the class to clarify academic issues and reads beyond the content of the curriculum). The measure, which has been used in several previous studies (Dæhlen & Havnes, 2005; Terum & Mastekaasa, 2006; Caspersen, 2015), ranges from 1 ('disagree') to 7 ('agree').

The latent construct *student climate* measures (c) student perceptions of the learning environment and consists of four items. Explorative factor analysis, using the Kaiser criterion for extraction, was performed to analyse the 17 items from the same section of the questionnaire (Kim & Mueller, 1978). Two examples are 'There is a poor social climate among the students' and 'There is a supportive climate among the students'. The measure ranges from 1 ('disagree') to 7 ('agree'). Cronbach's alpha values for this measure are a bit weaker than for the other measures used (0.62, 0.56 and 0.64 for health, education and engineering, respectively). The results of this construct should thus be interpreted with more caution.

Student engagement in class measures (d) the quality of the effort that students devote to educationally purposeful activities. This measure is based on seven items. Two examples are 'The teacher challenges and supports the students in their learning' and 'The students' ideas and comments are appreciated in class'. The quality of student effort is also measured by the average number of hours spent on three different tasks: organised study activities, individual studies and paid work outside of higher education.

The questionnaire from the first year also includes four questions concerning the students' level of dedication to their choice of academic major at the start of the study programme. Two examples of items on the questionnaire are 'I could just as easily have chosen a different programme' and 'I have known for many years that this was the programme I wanted to pursue'. The measure ranges from 1 ('disagree') to 5 ('agree'). The average grades from upper secondary school (obtained from national registers) are also included to control for the differences in the students' general abilities. This variable ranges from 1 (lowest) to 6 (highest). Dedication and grades measure (e) each student's background characteristics, combined with the parents' length of education.

The analyses are performed in two steps. First, the correlations among the different learning outcomes (grades, self-reported learning outcomes and professional commitment) are measured using the Pearson correlation coefficient *r*. Second, a linear regression (ordinary least squares) is performed to analyse the relationship between the independent variables and the dependent variables so as to investigate whether the same factors affect grades, self-reported learning outcomes and professional commitment. The different groups of professionals are included in the regression analyses as dummy variables, with engineering as the reference group. Group sizes do not allow separate analyses for each group but the comparisons that are not reported here do not show significant group variations. The number of institutions does not open up for controlling for clustering of observations, either, but previous research has shown that the variations among institutions are relatively small (Caspersen, 2013).

Results

Table 1 presents the correlations among grades, self-reported learning outcomes and professional commitment of the students belonging to one of the three groups. First, all self-reported learning outcome measures are highly and significantly correlated.

Second, a rather strong and positive relationship is found between professional commitment and the three self-reported learning outcomes. These results are quite similar for all three groups. The only exception is that the sizes of the correlation measures are different between commitment and the three self-reported learning outcomes in the three groups. This finding is especially true for the correlation between commitment and self-reported general competence in the three groups: 0.24 in health, 0.27 in engineering and (only) 0.11 in education. Education also shows weaker correlations between commitment and skills and between commitment and knowledge although the differences are smaller than between commitment and self-reported general competence.

[Table 1 near here]

Third, grades are not significantly correlated with professional commitment and (except for the health group) are only weakly, albeit significantly, correlated with the three self-reported learning outcomes. In the health group, a weak negative correlation exists between grades and skills and between grades and general competence. In education, the same negative relationships are found, in addition to a weak positive correlation between grades and knowledge. Engineering shows only a weak negative correlation between grades and skills.

The regression analyses (Table 2) show that grades from secondary school have a positive effect on grades upon graduation, whereas students' engagement has a minor negative effect. On average, students majoring in education have lower grades than engineering students in both models.

[Table 2 near here]

Study strategy has a significant positive effect on professional commitment, meaning that the more active students (defined as those who seek new knowledge independently, exert extra efforts and interact with the teaching staff) also report higher professional commitment. A weak positive effect is also found for time spent on individual studies. Dedication to the choice of the study programme also has a rather strong positive effect on professional commitment, whereas parental education has a weak negative influence. Students majoring in education have higher professional commitment than engineering students. Regarding self-reported learning outcomes, all three are positively affected by study strategy and experienced coherence and are negatively influenced by grades from upper secondary school. Student climate and time spent on self-study also have positive but relatively weak impacts on general competence and skills. Moreover, paid work is weakly associated with general competence. Students in the health field report lower levels of all three types of self-reported learning outcomes than engineering students and students majoring in education report a lower outcome in general competence compared with engineering students.

Grades, knowledge structures and intake quality

All self-reported learning outcomes, as well as professional commitment, are significantly correlated in all fields. This finding may indicate that although the different dimensions (knowledge, general competence, skills and commitment) are distinguishable as theoretical constructs, the dimensions are difficult to discern as operationalised indexes in a survey. Other possible explanations are that interactions exist among the variables and that the attainment of the different learning outcomes during professional education depends on one another (Caspersen, Frølich, Aamodt & Karlsen, 2014; Hatlevik, 2014). If so, this relationship touches on old debates about the relationship between 'knowing how' and 'knowing that' (Ryle, 1949), suggesting that it is difficult to 'know how' without 'knowing that' (Winch, 2014).

However, if the argument is that learning outcomes are dependent on one another, it is noteworthy that the regression analyses find different antecedents of the different learning outcomes. The implication is that although they are interrelated, different aspects of professional education programmes must be emphasised to promote one outcome or another.

The analyses first examine the correlations among grades, self-reported learning outcomes and students' professional commitment in the fields of health, education and engineering. Only weak correlations between grades and self-reported learning outcomes are found and the relationships vary among the three fields. Additionally, there is no significant relationship between grades and professional commitment in any of the fields. Previous research has also shown a weak correlation between grades and self-reported learning (Carini *et al*., 2006), indicating that self-reported learning outcomes and grades measure different dimensions. Furthermore, it is argued that differences in learning outcomes among professional groups are at least partly due to variations in professional knowledge structures (Caspersen *et al*., 2014).

The analyses show that grades from upper secondary school are significantly and positively related to grades upon graduation. None of the variables emphasised as important for student success in previous studies (Kuh *et al*., 2007, 2008) is positively related to grades upon graduation and students' engagement is even weakly negatively related. Notably, the fact that the results are collapsed across institutions may hide the variations in the findings, also concerning grades. However, the numbers of respondents and institutions do not allow more sophisticated analyses to account for this aspect, pointing to the need for further research.

The most important finding for practical use in higher education is perhaps that grades from upper secondary school are negatively related to two of the self-reported learning outcomes –general competence and skills – but are not significantly related to knowledge. A plausible interpretation is that students with higher average grades at enrolment tend to perceive themselves as more competent upon entry than students with lower grades and that students with higher grades develop their general competence to a lesser extent than students with lower grades. Thus, self-reported learning outcomes are contingent on the candidates' entry level, implying that comparisons among programmes should take input quality into account, in the most literal sense. Our knowledge of the actual use of self-reported learning outcomes measures in accountability and quality assurance systems in higher education does not indicate that this is common practice.

Most of the factors that have been previously singled out as important for student success (Carini *et al*., 2006; Kuh *et al*., 2007, 2008; Douglass *et al*., 2012) are significantly related to this study's self-reported learning outcome measures. As such, the study validates previous research in this area, by finding the same relations, although the underlying dimensions are approached differently. Study strategy is significantly associated with all three self-reported outcome variables, whereas such is not the case with time for self-study. It is well known that employing an active and critical study strategy is most conducive for a more in-depth understanding (Entwistle & Peterson, 2004). The inclusion of coherence in the empirical model is nevertheless an expansion of previous frameworks. Engagement and coherence are also positively related to the self-reported learning outcome

variables, providing an important supplement to operationalisations of structural characteristics in the institution used in previous research (Kuh *et al*., 2014). One reason may be that self-reported outcomes (unlike grades) include an affective aspect (Gonyea & Miller, 2011). Moreover, the positive relationship between paid work and self-reported skills makes sense because it is reasonable to assume that at least some of the occupational practice is relevant for the development of professional competence. For example, it is normal for nursing students to work part-time in health service institutions.

This study has also expanded previous frameworks by including professional commitment as an affective outcome variable. The correlation analyses show that professional commitment is not correlated with grades but significantly correlated with the self-reported learning outcomes in all three educational fields. However, the weaker relationship between professional commitment and self-reported learning outcomes in the field of education may indicate that professional commitment relates somewhat differently to the various aspects of knowledge and skills in the three professional fields.

This study's results also show that the level of parental education negatively affects professional commitment. It is well documented that high-status programmes (for example, medicine) are characterised by a high level of social reproduction. Students in these fields tend to have highly educated and economically well-off parents (Mastekaasa, 2004; Hansen, 2005, 2010). In low- and medium-status programmes (such as those included in this study), the level of parental education may have the opposite effect regarding encouragement and support. Nonetheless, the rather weak relationships warn against placing too much emphasis on these results; instead, they should be regarded as providing an opening for future research.

What do outcomes measure?

The traditional way that learning outcomes have been measured is through grades (Caspersen *et al.,* 2017). It is the most frequently used means to provide students with feedback on their academic progress and performance. It is also an important indicator when employers recruit a newly qualified workforce. The most important difference between grades and self-reported learning outcome measures is the level of subjectivity and objectivity involved. Grades can be set according to different standards, often divided in criterion based or reference based uses, although there are large differences within these two different approaches as well (Sadler, 2005). For the purpose of this article, it suffices to state that grades are used to compare students with one another. Even though this is not always the case, the ideal is that grades are characterised by some kind of objectivity (Yorke, 2009). In contrast, self-reported learning outcomes are based on each student's subjective assessment; in other words, students individually compare their outcome with their own starting point. An interesting point in this regard is that although the learning outcomes' approach to higher education implies stating clear competence goals for the educational programmes, the self-assessment of these goals is not necessarily related to the level of expertise or proficiency but to the level or degree of personal development. Whereas learning outcomes in higher education are mostly perceived as using a reference-based criterion approach, the self-assessment of learning outcomes refers to a personal set of criteria, relative to the individual. In this light, it is questionable whether self-reported learning outcomes measure the intended level of proficiency related to a professional standard (as described in a curriculum's learning outcome goals) or whether they measure the contribution of higher education to personal and professional development.

The crux of the matter is to have some kind of base reference. What levels of competence and proficiency do the graduates possess upon entry and how can their self-assessed learning outcomes be understood relative to these? In this study's design, this base level is included by introducing grades upon entry to higher education. The students' self-reported learning outcomes are based on their experiences of how much knowledge they have acquired. Even though they compare themselves with their fellow students to some extent, their information on others is limited. This paper argues that this subjective dimension of self-reported learning outcomes may be regarded as a strength and that subjective assessment may be considered a measurement of some kind of value-added results rather than mastery of objective standards. In the analyses, this argument is also supported by the negative effect of grades from upper secondary education on the self-reported learning outcomes comprising skills, knowledge and general competence. This finding indicates that students with high grades report lower outcomes. Students with high grades from upper secondary school also have high grades upon graduation. If so, it is also likely that they provide lower self-reported learning outcomes in general competence and skills even though they tend to achieve higher grades upon graduation. Based on this argument, this study supports scholars who claim that self-reported measures constitute a feasible source of useful data (Kuh *et al*., 1997) on outcomes of education but it also adds that a benchmark reference (grades upon enrolment) provides a valuable and necessary point of reference. From a policy perspective, this is highly relevant knowledge, as many assessments of quality in higher education are at least partly based on comparisons of self-reported learning outcomes.

Concluding remarks

This study's analyses of students' self-reported learning outcomes (knowledge, general competence and skills) show that these variables are positively influenced by factors that have been reported to be related to student success and development (for example, Pascarella & Terenzini, 2005; Kuh *et al*., 2008). However, grades upon graduation are not positively related to these variables. Grades from upper secondary school are positively related to grades upon graduation and negatively related to the self-reported learning outcomes. Moreover, grades upon graduation are only weakly correlated with self-reported learning outcomes and professional commitment. This finding raises the following question: what do grades, which constitute the most common learning outcome measure, actually measure?

Different questions can be posed, depending on the perspective involved. From an employability perspective, what kind of information should employers rely on when choosing among graduates? From an educational quality-improvement perspective, what kinds of indicators and outcomes should be used in decisions on curriculum and study plan reforms? Do grades represent a valid measure of study quality, or should more emphasis be placed on self-reported learning outcomes? As quality assurance in higher education has moved from an input and process orientation to an outcome orientation (Ball, 2009), it is important to continue to develop the knowledge base on how different outcomes are constructed and related as we have done in this article. At the same time, it is also important to expand the idea of what counts as outcomes. By including professional commitment, this article sheds some light on the expansion of outcomes.

Professional commitment at the end of studies is not correlated with grades but is moderately to strongly correlated with self-reported learning outcomes. The regression analyses indicate that all these variables measure different aspects of educational outcomes. The arguments presented at the start of the article and the results of the analyses show that professional commitment should be included as an independent theme when measuring learning outcomes in professional education.

In future research, the inclusion of data on professional careers and further professional development in the analyses may contribute to a better understanding of what self-reported learning outcomes and grades measure. Learning outcome measures that also reflect employability and professional performance would be highly relevant to employers.

With the inclusion of a direct value-added measure based on longitudinal data (Klein *et al*., 2007), the approach to self-reported learning outcomes in this article together with affective dimensions such as professional commitment would provide a more comprehensive and broader measurement of outcomes. Scepticism towards such measures still exists and a lot of work remains to be done to establish sound measures of learning outcomes (Green, 2011). Arguably, the inclusion of standardised learning measures, results from rubrics and tests in the same analyses as grades and self-reported learning outcomes may represent a way to further validate these instruments. The first (and perhaps less demanding) step would involve developing learning outcome measures that are specific to particular professions, as they have been shown to replicate professional knowledge structures (Caspersen, *et al*., 2014; Sweetman *et al*., 2014). As shown in the work presented previously in this article, it is also vital to control for the quality of students at enrolment (for example, based on grades in upper secondary school). Doing so would bring self-reported outcomes closer to standardised learning measures in many respects (Klein *et al*., 2005, 2007) and present a bridge between research approaches that also would provide fruitful insights for the field of practice in higher education.

References

Allais, S., 2014, *Selling out Education: National qualifications frameworks and the neglect of knowledge* (Rotterdam, Sense).

Ambler, V.M., 2006, Who flourishes in college? Using positive psychology and student involvement theory to explore mental health among traditionally aged undergraduates, PhD dissertation, College of William and Mary., Virginia: USA

Astin, A.W., 1970a, 'The methodology of research on college impact, part one', *Sociology of Education*, 43(3), pp. 223–54.

Astin, A.W., 1970b, 'The methodology of research on college impact, part two', *Sociology of Education*, 43(4), pp. 437–50.

Astin, A.W., 1991, *Assessment for Excellence: The philosophy and practice of assessment and evaluation in higher education* (New York, American Council on Education/Macmillan).

Ball, S.J., 2009, 'Privatising education, privatising education policy, privatising educational research: network governance and the "competition state"', *Journal of Education Policy*, 24(1), pp. 83–99.

Becker, G.S., 1964, *Human Capital: A theoretical and empirical analysis, with special reference to education* (New York, National Bureau of Economic Research).

Belcheir, M.J., 2001, 'What predicts perceived gains in learning and in satisfaction', *Learning*, 74(57), pp. 2–35.

Benner, P., Sutphen, M., Leonard, V. & Day, L., 2010, *Educating Nurses: A call for radical transformation* (San Francisco, Jossey-Bass).

Billett, S., 2009, 'Realising the educational worth of integrating work experiences in higher education', *Studies in Higher Education*, 34(7), pp. 827–43.

Blau, G., 2000, "Job, organizational, and professional context antecedents as predictors of intent for interrole work transitions', *Journal of Vocational Behavior*, 56(3), pp. 330–45.

Blau, G. & Lunz, M., 1998, 'Testing the incremental effect of professional commitment on intent to leave one's profession beyond the effects of external, personal, and work-related variables', *Journal of Vocational Behavior*, 52(2), pp. 260–69.

Caspersen, J., 2013, Professionalism among novice teachers. How they think, act, cope and perceive knowledge. Ph.d-dissertation, Oslo and Akershus University College Oslo

Caspersen, J., 2015, 'Teachers' learning activities in the workplace: how does teacher education matter?' *Creative Education*, 6(01), p. 46.

Caspersen, J., Frølich, N., Karlsen, H. & Aamodt, P.O., 2014, 'Learning outcomes across disciplines and professions: measurement and interpretation', *Quality in Higher Education*, 20(2), pp. 195–215.

Caspersen, J., Smeby, J.-C., & Aamodt, P.O., 2017, 'Measuring learning outcomes', *European Journal of Education*, 52(1)

Carini, R.M., Kuh, G.D. & Klein, S.P., 2006, 'Student engagement and student learning: testing the linkages', *Research in Higher Education*, 47(1), pp. 1–32.

Cort, P., 2010, 'Stating the obvious: The European Qualifications Framework is not a neutral evidence-based policy tool', *European Educational Research Journal*, 9(3), pp. 304–16.

Dæhlen, M. & Havnes, A., 2005, 'Studiestrategier i profesjonsutdanningene', *Ingeniøruddannelsernes pædagogiske netværk*, 16(1), pp. 12–13.

Douglass, J.A., Thomson, G. & Zhao, C.-M., 2012, 'The learning outcomes race: the value of self-reported gains in large research universities', *Higher Education*, 64(3), pp. 317–35.

Entwistle, N.J. & Peterson, E.R., 2004, 'Conceptions of learning and knowledge in higher education: relationships with study behaviour and influences of learning environments', *International Journal of Educational Research*, 41(6), pp. 407–28.

Freidson, E., 2001, *Professionalism: The third logic* (Cambridge, Polity Press).

Gonyea, R.M. & Miller, A., 2011, 'Clearing the air about the use of self-reported gains in institutional research', *New Directions for Institutional Research*, 2011(150), pp. 99–111.

Green, M.F., 2011, 'Lost in translation: degree definition and quality in a globalized world', *Change: The Magazine of Higher Learning*, 43(5), pp. 18–27.

Grossman, P., Hammerness, K.M., McDonald, M. & Ronfeldt, M., 2008, 'Constructing coherence: structural predictors of perceptions of coherence in NYC teacher education programs', *Journal of Teacher Education*, 59(4), pp. 273–87.

Hall, R.H., 1968, 'Professionalization and bureaucratization', *American Sociological Review*, 33(1), pp. 92–104.

Hansen, M.N., 2005, 'Utdanning og ulikhet – valg, prestasjoner og sosiale settinger', *Tidsskrift for samfunnsforskning*, 46(2), pp. 133–57.

Hansen, M.N., 2010, 'Change in intergenerational economic mobility in Norway: conventional versus joint classifications of economic origin', *Journal of Economic Inequality*, 8(2), pp. 133–51.

Harvey, L. and Drew, Sue with Smith, M., 2006, *The First-Year Experience: Review of the Research Literature*. York, Higher Education Academy

Hatlevik, I.K., 2014, Meningsfulle sammenhenger. En studie av sammenhenger mellom læring på ulike arenaer og utvikling av ulike aspekter ved profesjonell kompetanse hos studenter i sykepleier-, lærer- og sosialarbeiderutdanningen, PhD dissertation, Oslo and Akershus University College, Norway.

Heggen, K. & Terum, L.I., 2013, 'Coherence in professional education: does it foster dedication and identification?', *Teaching in Higher Education*, 18(6), pp. 656–69.

Karabel, J. & Halsey, A.H., 1977, 'Educational research: a review and interpretation', in Karabel, J. & Halsey, A.H. (Eds.) *Power and Ideology in Education*, pp. 1–85 (New York, Oxford University Press).

Kim, J.-O. & Mueller, C.W., 1978, *Factor Analysis: Statistical methods and practical issues* (Beverly Hills, CA, Sage).

Klein, S., Benjamin, R. Shavelson, R. & Bolus, R., 2007, 'The collegiate learning assessment: facts and fantasies', *Evaluation Review*, 31(5), pp. 415–39.

Klein, S.P., Kuh, G., Chun, M., Hamilton, L. & Shavelson, R., 2005, 'An approach to measuring cognitive outcomes across higher education institutions', *Research in Higher Education*, 46(3), pp. 251–76.

Kuh, G.D., Cruce, T.M., Shoup, R., Kinzie, J. & Gonyea, R.M., 2008, 'Unmasking the effects of student engagement on first-year college grades and persistence', *Journal of Higher Education*, 79(5), pp. 540–63.

Kuh, G.D., Kinzie, J., Buckley, J.A., Bridges, B.K. & Hayek, J.C., 2007, *Piecing together the student success puzzle: Research, propositions, and recommendations* (San Francisco, Jossey-Bass).

Kuh, G.D., Pace, C.R. & Vesper, N., 1997, 'The development of process indicators to estimate student gains associated with good practices in undergraduate education', *Research in Higher Education*, 38(4), pp. 435–54.

Kuh, George D, Jankowski N., Ikenberry, S.O., and Kinzie J., 2014, *Knowing What Students Know and Can Do: The current state of student learning outcomes assessment in US colleges and universities* (Urbana, IL: University of Illinois and Indiana University, National Institute for Learning Outcomes Assessment).

Lu, K.-Y., Lin, P.-L., Wu, C.-M., Hsieh, Y.-L. & Chang, Y.-Y., 2002, 'The relationships among turnover intentions, professional commitment, and job satisfaction of hospital nurses', *Journal of Professional Nursing*, 18(4), pp. 214–19.

Macfarlane, B. & Tomlinson, M., 2017, 'Critical and alternative perspectives on student engagement', *Higher Education Policy*,30 (1), pp. 1–4.

Mastekaasa, A., 2004, 'Social origins and recruitment to Norwegian business and public sector elites', *European Sociological Review*, 20(3), pp. 221–35.

Mastekaasa, A., 2009, 'Organisational commitment among public and private sector professionals', SPS Working Paper 1/09, Oslo University College, Norway.

Olivas, M.A., 2011, 'If you build it, they will assess it (or, an open letter to George Kuh, with love and respect)', *Review of Higher Education*, 35(1), pp. 1–15.

Pascarella, E.T. & Terenzini, P.T., 2005, *How College Affects Students: Vol. 2. A third decade of research* (San Francisco, Jossey-Bass).

Porter, S.R., 2011, 'Do college student surveys have any validity?', *Review of Higher Education*, 35(1), pp. 45–76.

Porter, L.W., Steers, R.M., Mowday, R.T. & Boulian, P.V., 1974, 'Organizational commitment, job satisfaction, and turnover among psychiatric technicians', *Journal of Applied Psychology*, 59(5), pp. 603–09.

Pröitz, T.S., 2010, 'Learning outcomes: What are they? Who defines them? When and where are they defined?', *Educational Assessment, Evaluation and Accountability*, 22(2), pp. 119–37.

Ryle, G., 1949, *The Concept of Mind* (Chicago, University of Chicago Press).

Sadler, D. R., 2005, 'Interpretations of criteria-based assessment and grading in higher education', *Assessment & Evaluation in Higher Education*, 30(2), pp. 175–94.

Smeby, J.-C., & Heggen, K., 2014, 'Coherence and the development of professional knowledge and skills', *Journal of Education and Work*, 27(1), pp. 71–91.

Schön, D.A., 1987, *Educating the Reflective Practitioner: Toward a new design for teaching and learning in the professions* (San Francisco, Jossey-Bass).

Somech, A. & Bogler, R., 2002, 'Antecedents and consequences of teacher organizational and professional commitment', *Educational Administration Quarterly*, 38(4), pp. 555–77.

STUDDATA: http://www.hioa.no/eng/Forskning-og-utvikling/Hva-forsker-HiOA-paa/FoU-SPS/prosjekter/StudData (accessed on 28.05.2018)

Stensaker, B. & Sweetman, R., 2014, 'Impact of assessment initiatives on quality assurance', in Coates, H (Ed.) *HELOs and Trends in International Quality Assurance* (Frankfurt, Peter Lang). pp. 237–59.

Sweetman, R., Hovdhaugen, E. & Karlsen, H., 2014, 'Learning outcomes across disciplinary divides and contrasting national higher education traditions', *Tertiary Education and Management*, 20(3), pp. 179–92.

Terum, L.I. & Mastekaasa, A., 2006, 'Studenttilfredshet i profesjonsutdanningene', *Norsk pedagogisk tidsskrift*, 90(3), pp. 254–66.

Tinto, V., 1993, *Leaving College: Rethinking the causes and cures of student attrition*, second edition. (Chicago, University of Chicago Press).

Weiss, A., 1995, 'Human capital vs. signalling explanation of wages', *Journal of Economic Perspectives*, 9(4), pp. 133–54.

Winch, C., 2014, 'Know-how and knowledge in the professional curriculum', in Young, M. & Muller, J. (Eds.) *Knowledge, Expertise and the Professions*, pp. 47–60 (London, Routledge).

Yorke, M., 2009, 'Grading student achievement in higher education', in Malcolm, T., Mok, K. H. , Huisman, J., Morphew, C (Eds.) *The Routledge International Handbook of Higher Education* (New York, Routledge).

Appendix 1. Descriptive statistics for all variables and indexes used.

Learning outcome	Groups	Mean	Std. Err.	[95% Conf. Interval]		Items	Alpha
Generic skills	Health	3.35	0.03	3.30	3.40	7	0.84
	Education	3.54	0.03	3.47	3.61		0.85
	Engineering	3.33	0.04	3.25	3.41		0.78
Theoretical competence	Health	3.89	0.03	3.83	3.95	1	*n.a.*
	Education	3.89	0.03	3.82	3.95		*n.a.*
	Engineering	3.91	0.06	3.80	4.02		*n.a.*
Relational/communication skills	Health	3.80	0.03	3.75	3.85	6	0.82
	Education	3.55	0.03	3.48	3.61		0.86
	Engineering	3.18	0.05	3.08	3.28		0.83
Grades	Health	2.19	0.02	2.15	2.23	*n.a.*	*n.a.*
	Education	2.36	0.02	2.31	2.40		*n.a.*
	Engineering	2.33	0.04	2.26	2.40		*n.a.*
Professional commitment	Health	3.69	0,03	3.63	3.74	5	0.71
	Education	3.72	0.04	3.65	3.79		0.74
	Engineering	3.64	0.04	3.56	3.73		0.55
Student engagement							
Engagement in class	Health	4.29	0.04	4.21	4.38	7	0.79
	Education	4.30	0.04	4.22	4.39		0.77
	Engineering	4.12	0.07	3.98	4.26		0.78
Study strategy	Health	3.88	0.03	3.82	3.94	9	0.6
	Education	4.01	0.04	3.94	4.08		0.61
	Engineering	4.03	0.05	3.93	4.13		0.64
Time spent on organised studies (hours per week)	Health					*n.a.*	*n.a.*
	Education						*n.a.*
	Engineering						*n.a.*
Time spent on individual studies (hours per week)	Health					*n.a.*	*n.a.*
	Education						*n.a.*
	Engineering						*n.a.*
Time spent on work outside studies (hours per week)	Health					*n.a.*	*n.a.*
	Education						*n.a.*
	Engineering						*n.a.*
Student climate	Health	5.29	0.04	5.21	5.37	4	0.62
	Education	5.53	0.04	5.45	5.61		0.56
	Engineering	5.08	0.08	4.92	5.23		0.64
Dedication to choice	Health	3.56	0.03	3.49	3.62	4	0.67
	Education	3.68	0.04	3.61	3.75		0.73
	Engineering	3.41	0.06	3.29	3.53		0.76
Perceived coherence	Health	5.01	0.05	4.91	5.12	2	0.68
	Education	4.97	0.06	4.85	5.09		0.74
	Engineering	3.80	0.10	3.60	4.00		0.74
Background							
Education in years, father or mother	Health	4.01	0.06	3.89	4.12	*n.a.*	*n.a.*
	Education	4.16	0.07	4.03	4.30		*n.a.*
	Engineering	4.01	0.08	3.85	4.17		*n.a.*

Table 1. Correlations (r) among grades, self-reported generic skills, self-reported theoretical competence, self-reported relational/communication skills and professional commitment.

	Health			
	Grades	Professional commitment	General competence	Knowledge
Professional commitment	-0,03			
	697			
General competence	-0.14*	0.18*		
	665	679		
Knowledge	0,04	0.19*	0.20*	
	680	697	679	
Skills	-0.12*	0.20*	0.56*	0.29*
	671	688	673	689
	Education			
	Grades	Professional commitment	General competence	Knowledge
Professional commitment	0,02			
	459			
General competence	-0.11*	0.19*		
	443	507		
Knowledge	0.10*	0.18*	0.32*	
	451	520	510	
Skills	-0.12*	0.17*	0.70*	0.27*
	444	511	505	514
	Engineering			
	Grades	Professional commitment	General competence	Knowledge
Professional commitment	0,05			
	267			
General competence	-0,12	0.22*		
	248	266		
Knowledge	0,02	0,05	0	
	257	276	265	
Skills	-0.13*	0,04	0.58*	0,11
	246	264	253	265

Note: Coefficients significantly different from zero are marked with *p < 0.05, **pp < 0.01, *** p < 0.001.

Table 2. Ordinary least squares regression on grades, professional commitment, self-reported generic skills, self-reported theoretical competence and self-reported relational/communication skills. Regression coefficients (unstandardised).

		Grades	Professional commitment	Knowledge	General competence	Skills
Structural characteristics	Perceived coherence	0.03	0.03	0.07***	0.10***	0.09***
	s.e.	0.02	0.02	0.02	0.02	0.02
Interactions with faculty and staff members	Study strategy	0.04	0.12**	0.08**	0.14***	0.08*
	s.e.	0.03	0.04	0.03	0.03	0.03
Learning environment	Student climate	0.04	0.04	0.05	0.08**	0.10***
	s.e.	0.03	0.03	0.02	0.03	0.03
Quality of student effort	Engagement	-0.05*	0.06	0.04	-0.02	0.04
	s.e.	0.02	0.03	0.02	0.03	0.03
	Organised study activities	0	0	0	0.01	0
	s.e.	0	0	0	0	0
	Self-study	0.01	0.01*	0	0.01*	0.01**
	s.e.	0	0	0	0	0
	Paid work	0	0.01	0	0.01*	0
	s.e.	0	0	0	0	0
Student background characteristics	Dedication	0.02	0.46***	0.04	0.04	0.09**
	s.e.	0.03	0.04	0.03	0.03	0.03
	Highest parental education	0.02	-0.04*	-0.01	-0.01	0
	s.e.	0.01	0.02	0.01	0.02	0.01
	Average grades in upper secondary school	0.51***	-0.06	-0.11*	-0.25***	-0.26***
		0.05	0.06	0.04	0.05	0.05
Groups	Health	0.09	0.01	-0.17*	-0.42***	-0.45***
	s.e.	0.08	0.1	0.07	0.09	0.08
	Education	-0.18***	0.13*	0.04	-0.14*	0.1
	s.e.	0.05	0.06	0.05	0.06	0.05
	Constant	-0.18	1.15***	2.88**	3.11***	2.83***
		0.26	0.33	0.24	0.3	0.28
	Explained variance	0.22	0.28	0.15	0.21	0.24

Note: Coefficients significantly different from zero are marked with p*<0.05, p**<0.01, p***<0.0 1. s.e.=standard error.