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This study considers relationships between approaches to learning, learner identities, self-efficacy beliefs and academic achievement in higher education. In addition to already established survey instruments, a new scale, subject area affinity, was developed. The scale explores the extent to which students identify with their area of study and imagine being part of it in future. The new scale showed strong psychometric properties when it was tested on a sample of 4,377 students at a research intensive university. The new scale correlated positively with both the deep approach and self-efficacy scales. The new scale also correlated negatively with the surface approach scale. K-means cluster analysis identified seven distinct groups of students who espoused interpretable combinations of approaches, self-efficacy and subject area affinity. Cluster membership was associated with differences in academic achievement. Implications are discussed.

Key words: learner identities; approaches to learning; organised effort; self-efficacy beliefs; academic achievement.

Introduction

Students' Approaches to Learning and Studying

The findings reported in this paper build on 40 years of research into students' approaches to learning and studying. This work began when Marton and Säljö identified the crucial distinction between deep and surface approaches, which has underpinned ongoing research in this area (Marton and Säljö 1976; Marton and Säljö 1997). These studies investigated students' experiences of reading academic articles provided by the researchers and also their day-to-day study activities. Through this work, Marton and Säljö identified qualitative differences in students' understanding which they explained in terms of qualitative differences in how students approached their learning. Some students took a deep approach to learning (then referred to in terms of levels of processing) which involved working to understand the meaning of what they were learning. Other students adopted a surface approach in this context, focusing on reproducing features of the learning materials without seeking understanding.

Since the original research, this broad distinction between deep and surface approaches has been repeatedly identified across a wide range of qualitative and quantitative studies in diverse countries and subject areas, by different research teams and using different research tools (Biggs and Tang 2011; Entwistle 2009; Entwistle and McCune 2004). Approaches to learning have been related to the quality of students' learning outcomes although this may depend on the assessment method used and the relationships are not always strong (Richardson, Abraham, and Bond 2012; Watkins 2001). Correlations have also been identified between students' approaches and their perceptions of their teaching-learning environments (Entwistle, McCune, and Hounsell 2003; Lizzio, et al. 2002).

As research in this area began to focus more closely on students' day-to-day studies, a third approach was identified. This was labelled the strategic or achieving approach and brought together a focus on achieving high grades with well organised studying and alertness to assessment requirements (Biggs 1987; Entwistle and Ramsden 1983; Entwistle and McCune 2004). As research in

this area has developed, the emphasis in the questionnaires used to explore approaches to learning and studying has shifted away from achievement motivation and toward how students manage and organise their learning. The strategic approach has been replaced in these instruments with an emphasis on organised studying and effort management (Entwistle and McCune 2004).

The Present Research and Aim of Study

The present research builds on this tradition of research into approaches to learning and studying by integrating a new scale and exploring its relationships to approaches to learning in a new context. The instrument used in this study is a translation of a Finnish questionnaire incorporating approaches to learning (Parpala and Lindblom-Ylänne 2012) to which we have added an additional scale focusing on students' identification with their subject area communities (*subject area affinity*). The Finnish questionnaire was a development of the Experiences of Teaching and Learning Questionnaire (ETLQ) which was originally constructed during the Enhancing Teaching-Learning Environments in Undergraduate Courses (ETL) Project, funded by the Economic and Social Research Council in the UK (Entwistle et al. 2003).

The motivation for considering students' identification with their subject area communities in the present research initially grew from Tinto's student integration model (Tinto 1975, 1997) which was designed to explain the aspects and processes that influence students' decisions to leave college. Drawing parallels to Durkheim's sociological theory of individuals' decision to leave community (by committing suicide), Tinto asserted that dropout from college occurs because of the student being insufficiently integrated into important aspects of college life, that is, the insufficient interaction with others in the institution and an insufficient congruency with the prevailing values and norms within the college. Furthermore, Tinto differentiated between social and academic integration. In Tinto's view, students assess their academic integration via their academic performance and their sense of intellectual development (Tinto 1975). In a later revision of the model, Tinto (1997) considered academic integration as being nested within the broader sphere of social integration and at the same time Tinto switched the focus to the student-faculty interaction occurring within the college classroom as the main driver of social and academic integration.

The main theoretical constructs within the student integration model were operationalised in an inventory designed by Pascarella and Tenzini (1980) and building on this, we developed a short four-item scale intended to measure the latent construct of academic integration. However, while the model and especially the concept of academic integration was the original motivation for the present research, the scope of the model was found to be too narrow. First, the notion of academic integration in Tinto's model is restricted to a sense of integration within the institution. However, we were more interested in integration within a disciplinary community within and beyond the institution (e.g., the integration into the practice of an academic discipline or the practice of a profession). Second, Tinto's model essentially focuses on student retention while we were more interested in the role of academic integration in relation to student learning. Inspired by the recent advances in higher education research, we wanted to test the scale and consider it in relation to the situated perspectives on learning including those which had been developed during the ETL project (Anderson and Hounsell 2007; McCune and Hounsell 2005).

A key emphasis within the ETL project was to go beyond generic measures of approaches to learning to consider what was understood as high quality learning within particular subject areas

(McCune and Hounsell 2005). In conceptualising high quality learning, the project team drew on situated perspectives on learning as a lens to make sense of the qualitative data from the project. In particular, the team developed the notion of the *ways of thinking and practising (WTP)* of a subject area to encompass the depth and richness of students' learning in a given subject area in a specific context. Students might learn, for example, come to terms with the norms, values, particular understandings and forms of discourse which are understood as central to graduate-level mastery of a subject area (McCune and Hounsell 2005). In taking this perspective, academic subject areas and related groupings were being understood as communities with particular values and ways of working which iteratively shape what is seen as high quality academic work. One way to frame this is in terms of the literature on communities of practice (Anderson and McCune 2013; Wenger 1998). Whilst there have been various justified critiques of the limitations of the work on communities of practice, it is still a fruitful line of enquiry for making sense of learning in higher education, particularly in more recent formulations (Anderson and McCune 2013). In recent writing, Wenger et al. (2009) offer descriptions of communities of practice which are more fluid and overlapping than was apparent in previous texts and this fits well with our views on higher education contexts.

Writing about communities of practice, Wenger (1998) notes that participants can take on a range of possible imagined trajectories in relation to each community, which form an important part of their learner identities. These include inbound trajectories – where learners imagine becoming full participants in the community in future – and outbound trajectories – where participants envisage moving on out of a particular community. These imagined trajectories have important implications for how meaningful learners find their studies and thus it may be that these aspects of learners' identities would be relevant to their approaches to learning. We aim to begin to test this possibility in our analyses incorporating the *subject area affinity* scale. The scale taps into students' identification with a future in their subject area community. Wenger also notes that an important aspect of learners' identities in relation to particular communities is their sense of familiarity and competence in that context. Learners partly define themselves in terms of the contexts where they feel competent or their disidentification with communities where they sense the lack competence. In this research, the scale added by the Finnish researchers on students' self-efficacy taps into this aspect of learners' identities.

To summarise, the aim of the present research was fourfold: First, to develop and test the psychometric properties of the new scale; second, to explore the relationships between the scale and students' approaches to learning and self-efficacy beliefs; third, to explore whether we could identify distinct groups of participants who espoused interpretable combinations of approaches, self-efficacy and subject area affinity; and fourth, to compare the groups of students in relation to academic achievement. Based on these analyses, the intention was to further elucidate the connections between research into students' approaches to learning and situated perspectives on learning.

Methodology

Study Context

The study concerns university students' approaches to learning and learner identities in a Danish context. In international comparison, a considerable proportion of Danish secondary school students continue onto higher education including university. For example, 41 % of the Danish 25-34 year olds

have attained a tertiary education degree and the proportion of youth expected to graduate from tertiary *academic* programmes during their lifetimes is 49 percent. These numbers are comparable to countries such as Finland, Australia, New Zealand, and the United Kingdom (OECD 2015). While drop-out rates among Danish higher education students are often considered to be too high from a national perspective, they are, however, low compared to other OECD countries (Ministry of Higher Education and Science 2013).

Danish university students pay no tuition fees. In addition, they receive financial benefits in terms of student grants and student loans. The financial assistance is subject to the condition that the student progresses in his/her studies according to the stipulated curriculum. Even though education is free and students receive financial assistance, it is common for students to work during their studies (Eurostudent 2011) and, also, it is common that this work is study-related (Aarhus University 2014). Thus, most students will have some degree of work experience when graduating from university and many will have had work experience that is closely related to their fields of study.

Finally, some characteristic curricular features regarding the design of a typical higher education programme should be noted. For example, within the individual programmes, students often have very limited possibilities with respect to choosing courses as they like, because specific courses are often mandatory to the specific programmes. This applies especially to Bachelor's programmes while students at the Master's level are often more free to choose among courses of their particular interest. Regarding assessment, it should be noted that most often, students are solely assessed on the basis of an end-semester examination and that the multiple choice examination format is very rare in the Danish educational system.

Design and Procedure

Data for this study were collected in connection with a larger triannual survey addressing the students' psycho-social study environment (Aarhus University 2014) and therefore the full questionnaire incorporated items and scales from various survey instruments. Data were collected in the first half of 2014. The response rate was 34 %. Students were requested to reply to an on-line questionnaire in which they were prompted to think of their major subject and to consider the study environment at the programme level. The study was registered with the Danish Data Protection Agency and all procedures were performed in compliance the APA's guidelines for conducting this type of study. Participation was voluntary and the data were kept confidential.

Participants

The study was carried out at Aarhus University which is a large and research-intensive university. Data were gathered at one of the university's four faculties, that is, the Aarhus School of Business and Social Sciences which covers a multitude of programmes offered by seven departments (e.g., political science, law, economics, and psychology. A total of 4,377 students completed the questionnaire. The participants were both Bachelor's (61 %) and Master's (39 %) students. The participants represented the departments of Economics (*N* = 1761, 40 %), Law (*N* = 615, 14 %), Business Communication (*N* = 599, 14 %), Political Science (*N* = 580, 13 %), Psychology (*N* = 523, 12 %), Business Technology (*N* = 216, 5 %), and Marketing (*N* = 83, 2%). Of the participants, 54 % (*N* =

2,350) were female and 46 % (*N* = 2,027) male. The proportion of international and foreign students was 8 %. The age ranged from 18 to 57 (*M* = 23.9, *SD* = 3.8).

Instruments

The results reported in this study were based on data collected by use of three sections of the Finnish *Learn* questionnaire (Parpala and Lindblom-Ylänne 2012) which was a further development of the British *Experience of Teaching and Learning Questionnaire* (ETLQ) (Entwistle et al. 2003). The first section of *Learn* includes a short version of the *Approaches to Learning and Studying Inventory* (ALSI, see Entwistle and McCune 2004); however, the Finnish researchers slightly changed the ALSI by modifying existing items and including three items from the *Learning and Studying Questionnaire* (LSQ) (Entwistle et al. 2003) and two items from the *Revised Learning Process Questionnaire* (R-LPQ) (Kember et al., 2004). Thus, the first section of the *Learn* questionnaire included 12 items measuring three aspects of students' approaches to learning; deep and surface approaches to learning and organised study. The second section of *Learn* included 22 items measuring students' experiences of the teaching-learning environment; this section is not reported on in this paper. Finally, the Finnish researchers included five items measuring students' self-efficacy beliefs. These items were adopted from the *Motivated Strategies for Learning Questionnaire* (MSLQ) (Pintrich et al. 1991) and modified to suite the programme level rather than the course level of analysis. Self-efficacy as it is used here refers to the students' self-appraisal of their ability to master a task and includes judgment about their ability to accomplish a task as well as their confidence in their skills to perform that task (Pintrich et al. 1991).

The three sections of *Learn* were translated into Danish with minor modifications, and a confirmatory factor analysis suggested that *Learn* with minor revisions was applicable in the context of Danish higher education ([Authors], unpublished paper). Thus, the inventory used in the Danish context included three scales measuring students' approaches to learning, six scales measuring students' experiences of the teaching-learning environment, and one scale measuring students' self-efficacy beliefs. In addition, the Danish researchers developed four items – set out in Table 1 – with the original intention to operationalise the concept of academic integration as described by Tinto (1975). The four items were chosen and further developed from a questionnaire developed by Pascarella and Terenzini (1980). The interpretation of these four items, discussed later, is the main focus of the present paper.

Table 1 about here

Finally, information about the students' university grade point average (GPA) was retrieved from the university's study administrative system. The Danish grading scale ranges from -3 (lowest) to 12 (highest) and is compatible with the European Credit Transfer and Accumulation Scheme (ECTS) grading system.

Data Analysis

The intention in applying exploratory factor analysis was to discover which variables in the set of variables formed coherent subsets that were relatively independent of one another. Given that the majority of items included in the analysis originated from already validated scales, confirmatory factor analysis would normally be considered the most suitable choice of factor analysis. However, exploratory factor analysis was chosen because no former analysis of the four items in focus of the present research had been conducted. While the decision whether an item should be retained or excluded from the analysis should rest on various considerations, Tabachnick and Fidell (2007) suggest that factor loadings below .32 are not interpreted.

Within the social sciences, guidance regarding the use of cluster analysis recognizes the need to balance parsimony with the retention of an adequate discrimination between clusters (Hair et al. 2008). Although statistical ways of indicating an appropriate number of clusters are available, in this study we chose to use K-means cluster analysis in an exploratory fashion looking for interpretable groupings of participants in relation to prior theory and research. This approach has been found to produce conceptually meaningful groupings in previous studies with data based on the ETLQ (e.g., Entwistle and McCune 2013).

Results

Prior to analysis, data were screened for missing values, influential outliers, and normality. Twenty-nine cases were deleted due to missing values on more than 25 percent of the items.

Testing the New Scale

The study's first aim was to test the newly developed scale. In this regard, principal axis factoring with varimax rotation was performed using SPSS (version 21) on 21 items for a sample of 4,348 students. Before rotation, five factors had eigenvalues over Kaiser's criterion of 1, explaining 59 percent of the variance. The scree plot showed inflexions that would justify retaining both 2 and 5 factors. Based on earlier study confirming the presence of three factors underlying students' approaches to learning alone, we chose to retain a five factor solution.

Both orthogonal (varimax) and oblique (promax) rotation was requested. The factor correlation matrix showed several moderate to strong correlation coefficients between factor scores, thus oblique rotation was preferred. Also, oblique rotation resulted in a cleaner factor solution. Promax rotation was chosen because it maximises simple structure; yet, allows the factors to correlate (Tabachnick and Fidell 2007) as would be theoretically expected.

Communalities between .205 and .539 before extraction were found to be acceptable. No items were complex, nor were there signs of outliers among variables; hence, all items were retained in the analysis. Loadings of variables on factors are shown in Table 2. Loadings below .32 are omitted for ease of interpretation, and interpretive labels are suggested for each factor.

Table 2 about here

The exploratory factor analysis produced a very clean factor solution suggesting that the four manifest variables in focus in the present paper reflected one latent factor that was distinct from the four factors representing students' approaches to learning and students' academic self-efficacy beliefs. Factors one through four were labelled in accordance with prior research. The fifth factor was labelled 'subject area affinity'; the rationale for this label is discussed later in the paper. Items were summarised into scales which were examined (see Table 3). Cronbach's alpha statistics < .7 indicated satisfactory internal reliability; however, the value for the subject area affinity scale was .665. Further analysis showed that deletion of one or more items would not result in greater internal reliability; hence, all items were retained.

Table 3 about here

Correlations between Subject Area Affinity, Approaches to Learning and Self-Efficacy

To address the study's second aim, that is, exploring the link between the subject area affinity scale and approaches to learning and students' self-efficacy beliefs, respectively; we computed Pearson's product-moment correlation coefficients to assess the statistical relationships between scales (Table 4). Subject area affinity was related negatively to the surface approach scale and positively related to the deep approach, organised study and academic self-efficacy beliefs scales respectively. Correlations were moderate in magnitude and statistically significant.

Table 4 about here

Identification of Interpretable Clusters

To answer the third research question, K-means cluster analysis was performed in order to identify groupings that were interpretable in relation to prior theory and research. Solutions from two up to ten clusters were considered starting with the two cluster solution and gradually expanding the number of groupings until further groups appeared redundant in terms distinctiveness and interpretability. In the end, the seven cluster solution was chosen.

Table 5 about here

The seven cluster solution is presented in Table 5. Cluster 1 appears to bring together participants with a strong subject area affinity but somewhat indistinct preferences for any particular approaches to learning. There are various possible interpretations of this cluster, including that these students

may be inclined to a deep approach due to their engagement with the subject area but are unable to fully enact that in their present teaching-learning environment. Cluster 2 is above average on organised studying and also surface approach, perhaps suggesting a deliberate choice to adopt the surface approach which may be seen as efficient by these students in their learning contexts. Cluster 3 brings together disorganised studying with below average scores on the deep approach and subject area affinity. This suggests a group of students who are less engaged with their subject area and their studies. The students in cluster 4 show a higher than average surface approach and lower scores on self-efficacy, deep approach and subject area affinity. A similar cluster to cluster 4 was apparent in all of the cluster solutions we considered. This group seem to lack confidence and engagement with their subject area. Cluster 5 shows a well-organised deep approach combined with stronger subject area affinity and greater self-efficacy. These students seem to be fully engaged with their studies. A similar cluster to cluster 5 was found in all of the solutions we considered. Cluster 6 is mainly defined by lower identification with the subject area but at the same time comparatively high academic self-efficacy. Cluster 7 seems to comprise students who are engaged with their subject area and attempting a deep approach but in a disorganised manner.

Analysis of Cluster Membership and Academic Achievement

To analyse the relationship between cluster membership and academic achievement, one-way analysis of variance was performed showing statistically significant differences between clusters $F(6, 4286) = 48.8$, $p < .001$, $\eta^2 = .064$. In a post-hoc analysis with Bonferroni correction, clusters were compared pairwise which showed statistically significant differences between all but three pairs (see Table 6). The lowest mean GPA was found in cluster 4 ($M = 6.28$, $SD = 1.97$). This cluster was characterised by high scores on the surface approach scale and low scores on the subject area affinity scale (see Table 5). The highest mean GPA was found in cluster 5 ($M = 7.87$, $SD = 1.84$), the cluster with high cluster means on the academic self-efficacy, deep approach, organised effort, and subject area affinity scales.

Table 6 about here

Discussion

Summary and interpretation of main findings

As stated in the introduction, the first aim of the present research was to develop and test a new scale reflecting students' identification with their subject area followed by a second more substantive aim, to explore the scale's relationships with core constructs from the student learning research literature. The new scale was given the label *subject area affinity* and it showed adequate psychometric properties. *Subject area affinity* showed statistically significant positive correlations with scales measuring the deep approach, organised effort, academic self-efficacy and academic achievement and a statistically significant negative correlation with the surface approach scale. This conceptually coherent pattern of correlations provides support for the construct validity of the new

scale. The effect of subject area affinity on academic achievement may be indirect through the influence of positive learner identities on approaches to learning. Future research could model these relationships in more detail.

The correlations between approaches to learning, self-efficacy and academic achievement were all in the expected direction. As is common in research in this area, the effect sizes are relatively modest. This may be partly because the measure of academic achievement taps into a range of different assessments which may each favour different approaches to learning more strongly. The largest effect size is for the correlation between self-efficacy and academic achievement. This may perhaps be explained by students who have had higher grades in the past tending to feel a greater sense of self-efficacy, so past success predicts both self-efficacy and future grades.

The study's third aim was to explore if distinct groups of student could be identified in regard to the study's main theoretical constructs. The cluster analysis described seven clusters characterised by different cluster means scales measuring subject area affinity, approaches to learning (including organised effort) and self-efficacy beliefs. Statistically significant and substantial differences between cluster groupings were found when comparing them on mean academic achievement. The relation between cluster membership and academic achievement was as would be expected, that is, the lowest academic achievement was found in the cluster grouping students with high scores on the surface approach scale and low scores on the subject area affinity and academic self-efficacy scales, respectively. The highest academic achievement was found among students with strong subject area affinity and academic achievement, applying an organised deep approach.

These coherent findings provide initial evidence to support the inclusion of the construct *subject area affinity* into quantitative research focused on student learning in higher education. Further research is required to explore whether the underlying factor and cluster patterns identified in the present research can be replicated across a range of settings. There are, however, connections with existing theory and research which begin to strengthen the argument for this new construct. The design of the scale built on Tinto's (1975) work on academic integration emphasising students' sense of connection and future within their field of study. This taps into the ways in which identification with a particular field of study contributes to the constitution of the participants' learner identities. This connects strongly with the notion of *trajectories* as set out by Wenger (1998). For Wenger, learners' identities are fundamentally temporal. Identities can be seen as trajectories shaped by the histories and practices of particular communities, constituted within particular situations, and encompassing a sense of where learners will be in future in relation to these communities. While Wenger's work is not without its critics, it provides a powerful theoretical frame for understanding student learning in higher education (Anderson and McCune 2013).

Encompassing these elements within the questionnaire also moves us on from previous research which has tended to emphasise broad categorisations of students' motivations and beliefs (Beaty, Gibbs and Morgan 1997; Pintrich 2000). Whist these categorisations remain useful, they are limited in the extent to which they can explain the roots of students' engagement with a particular area of study. More situated perspectives, such as the work of Wenger, can enhance the capacity of educational research to make sense of students' deep interest and critical engagement with their studies through analysis of the interplay between processes of participation and learners' developing identities. Where learners experience their current and imagined future with particular

communities as an important part of their sense of self, this gives relevance and meaning to what is studied (McCune 2009).

The future focus of subject area affinity is particularly important for understanding participants in higher education who will generally be expecting to shift between communities as they move within their institutions and move on to new roles. So, while there may be growing identification with a broad field of study, many students may still have the sense that joining their particular community is something that it is to come later (McCune 2009). Wenger's more recent work is particularly useful in making sense of this, as it emphasises that communities of practice are fluid, overlapping and open systems within which learners have membership simultaneously in multiple communities (Anderson and McCune 2013; Wenger et al. 2009). This is valuable in understanding situations where, for example, learners may interact with academic teachers who are members of one subject area sub-community for a time without directly participating in the same sub-community. Learners can also be seen as participants across a range of communities within and beyond their institution, while imagining future participation in other related communities. Wenger (1998) emphasised the role of feeling competent within a particular community as part of learners' identification with and participation in that group. Our data reinforce this connection through the positive correlations between self-efficacy, subject area affinity and a deep approach.

A further conceptual link between this new scale and theoretical perspectives on student learning can be found in the work of Gee (2007). Gee emphasises that it is crucial to active and critically engaged learning that students can participate in the discourses and practices which allow them to take on the identities, such as 'scientist' which relate to their subject area. If a student cannot identify with a subject area and other participants in that area, they are unlikely to feel motivated or able to engage deeply. Gee introduces the notion of a 'virtual identity' (Gee 2007, p. 49) where the participants are not yet scientists but are imagining themselves into that role. Gee notes that there needs to be some fit between students' real world identities and their virtual identities in order that their engagement with the subject area is not inhibited. This can then allow learners to develop a 'projective identity' (Gee 2007, p. 50) where they feel able to project their own desires, values and interests onto the virtual identity of being a scientist. It seems plausible that the new scale can be seen as a proxy for the development of suitable virtual and projective identities but further research will be required.

Gee (2007) also introduces the notion of 'affinity groups' to describe the 'group of people associated with a given semiotic domain' (Gee 2007, p. 27). Participants in these groups share similar norms, values, practices and ways of making meaning. They can also recognise one another as insiders. Gee emphasises the historical, social and cultural underpinnings of these groups and their importance for defining important identities for participants. These affinity groups are somewhat broader in definition than communities of practice, which is valuable in the context of researching student learning. Students are likely to move between communities of practice but may identify with a broad affinity group in the long term. This is the origin of the label we have given to the new scale: '*subject area affinity*'.

Our current findings - linking approaches and learner identities, particularly through the cluster analysis – also resonate with recent empirical work on the *disposition to understand for oneself* (Entwistle and McCune, 2013; Postareff et al. 2014). Entwistle and McCune reanalysed the data from the ETL project and identified a group of students who reported maintaining a deep approach to learning over time along with metacognitive awareness, strongly intrinsic reasons for

study and positive perceptions of the teaching-learning environment and their academic progress. Entwistle and McCune suggested that these and other findings reported in the literature were indicative of a group of students who had developed a more persistent *disposition to understand for oneself*. Postareff et al. (2014) provided additional empirical evidence for this concept based on mixed methods research with students in Finland. Cluster 5 in our data bears strong similarities to the cluster identified by Entwistle and McCune as representing this disposition to understand. Our data show a cluster linking self-efficacy and subject area affinity to deep and organised studying, Entwistle and McCune connected intrinsic reasons for study with deep and organised studying. Effective self-regulation of studying also features within the characterisation of the disposition to understand given by Postareff et al. (2014). Further, the strong attachment to the subject area described by Postareff et al. seems likely to overlap the notion of subject area affinity. These connections provide some initial indication that the findings of the present study may be replicable in other settings. Postareff et al. (2014) note that sophisticated conceptions of learning seem to contribute to the disposition to understand and it would be useful to include conceptions of learning alongside subject area affinity in our future research.

Exploring the relationships between learner identities and approaches to learning in these ways is valuable in explaining how a disposition to understand might come about. Whilst students often adapt their approaches to learning in relation to their perceptions of the teaching-learning environment, strong identification with their subject area would likely provide a greater sense of meaning and relevance for what is learned, rooted in an important aspect of a student's selfhood. It seems plausible that this would then underpin a disposition to understand even if the teaching-learning environment were not entirely favourable. McCune and Entwistle (2011) note the strength of feeling behind students' will to understand, again suggesting the importance of strong identification with the subject area.

Integrating quantitative research on students' approaches to learning with situated perspectives may seem an unlikely combination to some. This does, however, sit well with early research in this area which emphasised the relational nature of approaches to learning (Ramsden, 1987). In this perspective, approaches to learning are seen as arising in particular interactions between the individual and the context, rather than as a characteristic of individuals. This aligns well with situated perspectives on learning. While some of the research on approaches to learning has considered students' dispositions or tendencies, these dispositions can be seen as evolving over time in context and expressed in a situated manner in particular contexts. A student who identifies strongly with their subject area may well be more inclined to pursue a deep approach but that identification is constructed and reconstructed anew in context, as are the processes which would constitute a deep approach in a particular setting. This perspective aligns well with the work of Volet (2001) which outlines a multi-level model of influences on students' engagement with their studies drawing together more cognitive perspectives with work from socio-cultural traditions.

Limitations and possibilities for future research

As this is a cross-sectional study in a single institution, further research will be required to replicate and extend these findings in diverse contexts. For example, most of the programmes represented in this study had fairly strong vocational orientations (e.g. law and psychology). It would be interesting to extent the study to programmes with very strong professional orientations (e.g. medicine) as well

as programmes with a fairly weak professional orientation (e.g. arts programmes). In addition, the study will be required to be replicated outside the Scandinavian higher education context.

An ideal for future research would be to conduct longitudinal research in a range of contexts over the course of students' undergraduate degrees and into the beginning of their later employment or postgraduate studies. This would provide richer understanding of how learners' identities develop over time and how this relates to their approaches to learning. It would be valuable to have both qualitative and quantitative data in such a research project in order to allow deeper interpretation of the meanings of the clusters identified. Future research should also consider the interplay between approaches to learning, learner identities and teaching-learning environments through longitudinal studies. As noted previously, future research could also seek to develop the subject area affinity scale in order to modestly improve the internal reliability.

Ultimately the aim would be to create and investigate teaching-learning environments which support the development of students' ways of being such that they are better prepared for 'supercomplexity' (Barnett 2007). Supercomplex problems are those in which, firstly, the effects of actions are unpredictable and non-linear due to the inherent complexity of the systems on which one is acting. Secondly, supercomplex problems also involve competing and irreconcilable value positions (Barnett 2007). Dealing with the challenges posed by climate change is one example of a supercomplex problem but there are many others in our 21st century world. Possibilities for developing students' ways of being in preparation for supercomplexity might involve careful balancing of different aspects of curricula such as: support versus challenge (see also Postareff et al. 2014 on this point); situation within a discipline versus openess to other perspectives; local versus international foci; disciplined engagement versus play; and the shaping and enabling aspects of teaching (Anderson and McCune 2013b). Making use of authentic open-ended problems in teaching and drawing on the enabling possibilites of web 2.0 technologies, to encourage students to identify as active contributors rather than passive recipients, would also be promising in this regard (McCune and Entwistle 2011). Research which explored the impact of such teaching approaches on students' subject area affinities and broader dispositions would be very worthwhile.

Conclusions

The present study makes a significant contribution to the literature on student learning in higher education by developing a psychometrically sound measure of *subject area affinity,* a key facet of students' identities as learners. The research provides empirical evidence for the interplay between students' learner identities, their approaches to learning and their academic achievement. It was possible to identify distinct groups of participants who espoused interpretable combinations of approaches, self-efficacy and subject area affinity. These distinct groups differed significantly in their academic achievement. Connections with wider theoretical and empirical work in the literature strengthen the arguments for pursuing this line of research. This is an important direction to pursue if research in the student approaches to learning tradition is to be connected with situated perspectives, which are powerful in making sense of students' engagement with their studies. These findings open up the possibility for future mixed methods research which connects learners' identities with their learning and achievement longitudinally.

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Tables

Table 1. Items in the 'subject area affinity' scale

My studies have made me feel part of an academic community.
My study field is an important part of my identity.
I really look forward to working in my field.
Sometimes I doubt whether it was the right choice to study this subject (reversed).

Table 2. Pattern matrix of the loadings for the 21 items describing students' approaches to learning, subject area affinity and academic self-efficacy beliefs (maximum likelihood extraction, promax rotation).

Items					
	F1	F2	F3	F4	F5
I am confident that I can acquire the skills necessary to excel within my field of study.	.827				
I believe I will do well in my studies, as long as I make an effort.	.793				
I expect to do well in my studies.	.744				
I'm confident I can understand the basic concepts of my field of study.	.676				
I'm certain I can understand the most difficult material in my studies.	.455				
Topics are presented in such complicated ways I often can't see what is meant.		.772			
Even though I study some things over and over again to remember them, they do not make sense to me.		.734			
It is often hard for me to make sense of things I need to learn.		.713			
Much of what I learn is incoherent which means that I cannot connect it to a greater picture.		.494			
I organise my study time carefully to make the best use of it.			.782		
I am generally systematic and organised in my studies.			.769		
I have made a plan to ensure that I get through the entire curriculum during the semester.			.674		
I put a lot of effort into my studying.			.513		
I look at evidence carefully to reach my own conclusion about what I'm studying.				.656	
I consider ideas and perspectives presented in different texts (i.e. academic articles and teaching material).				.643	
I try to relate new material, as I am reading it, to what I already know on that topic.				.635	
I try to relate what I have learned in one course to what I learn in other courses.				.569	
My study field is an important part of my identity.					.753
I really look forward to working in my field.					.650

My studies have made me feel part of an academic community.					.456
Sometimes I doubt whether it was the right choice to study this subject.					-.432
F1	1				
F2	-.538	1			
F3	.137	.041	1		
F4	.479	-.371	.333	1	
F5	.377	-.275	.331	.384	1

Notes. Loadings below .32 have been omitted for ease of interpretation. Suggested labels: F1 (academic self-efficacy beliefs), F2 (surface approach to learning), F3 (organised effort), F4 (deep approach to learning), F5 (subject area affinity). Factor correlations are reported at the bottom of the table.

Table 3. Descriptive statistics for scales.

Scales	Range	Mean	SD	Skewn.	Kurtosis	α
1. Academic self-efficacy beliefs	1-5	4.10	0.63	-0.86	1.52	.830
2. Deep approach	1-5	3.59	0.69	-0.34	0.19	.716
3. Organised study	1-5	3.52	0.83	-0.41	-0.24	.770
4. Surface approach	1-5	2.57	0.77	0.45	-0.15	.766
5. Subject area affinity	1-5	3.89	0.73	-0.67	0.26	.665

Table 4. Pearson product-moment correlations between scales.

Scales	1	2	3	4	5	6
1. Academic self-efficacy beliefs	1.000					
2. Deep approach	.385**	1.000				
3. Organised study	.093**	.255**	1.000			
4. Surface approach	-.458**	-.246**	.054**	1.000		
5. Subject area affinity	.363**	.312**	.255**	-.320**	1.000	
6. Academic achievement (GPA)	.265**	.105**	.125**	-.255**	.162**	1.000

** p<.01

Table 5. Cluster centres for the seven-cluster solution.

Scales	Cluster						
	1	2	3	4	5	6	7
1. Academic self-efficacy beliefs	3.95	3.94	*3.91*	*3.13*	**4.59**	4.22	**4.49**
2. Deep approach	3.13	3.84	*3.03*	*2.89*	**4.16**	3.73	**3.91**
3. Organised study	3.61	**4.13**	*2.29*	3.38	**4.23**	3.75	*2.68*
4. Surface approach	2.45	**3.57**	2.60	**3.53**	*1.95*	2.39	*2.05*
5. Subject area affinity	**4.26**	3.98	*3.11*	*3.07*	**4.50**	3.29	4.24
Cluster size	748	604	484	455	872	561	622

Note. All scales range from 1 (lowest) through 5 (highest). For ease of interpretation, the samples mean score for all scale is reported. Also for ease of interpretation, the two highest scores for each scale are in **bold** while the two lowest scores are in *italic*.

Table 6. Mean university GPA for the seven clusters. Pairs of means grouped by a vertical line are not significantly different from each other (Bonferroni method, $p > .05$).

	N	Mean	SD
Cluster 4	445	6.28	1.97
Cluster 3	480	6.74	1.97
Cluster 2	591	6.81	1.89
Cluster 1	743	7.20	1.73
Cluster 6	552	7.23	2.02
Cluster 7	614	7.52	1.73
Cluster 5	868	7.87	1.84
Total	4293	7.18	1.93

Notes. Mean university GPA ranges from -3 (equal to an 'F') to 12 (equal to an 'A'). For ease of interpretations, clusters are ordered by mean university GPA.