Students' agency profiles in relation to student-perceived teaching practices in university courses

Päivikki Jääskelä, Anna-Maija Poikkeus, Päivi Häkkinen, Kati Vasalampi, Helena-Rasku-Puttonen, and Asko Tolvanen

University of Jyväskylä, Finland

Abstract

This study addresses the gap in our understanding of the role of pedagogy in agency construction among higher education students. In the present study, profiles of students' agency experiences were identified and analysed with respect to the students' perceptions of teaching practices in their courses (i.e., student-centred learning activities, forms of instruction, and student-teacher roles). The Agency of University Students (AUS) Scale (Jääskelä et al., 2017) was used to assess the students' experiences of their personal, relational, and participatory resources of agency. Agency profiles were found to be associated with students' perceptions of teaching practices in the courses. The findings have implications for developing practices that promote agency construction in higher education.

Keywords: student agency, latent profile analysis, student-centred learning, teaching practices, higher education

1. Introduction

Providing students with equal opportunities for acquiring the competencies needed in the modern work market is a central challenge for higher education (Michelsena, 2011; OECD, 2013). Recent studies on work-related learning have emphasised agency as a core component of professionalism (Goller & Paloniemi, 2017). The role of agency is considered relevant for lifelong learning and coping with changes in work life (Su, 2011), creativity and transformed practices of expert work (e.g., Collin et al., 2018; Hökkä, Vähäsantanen, & Mahlakaarto, 2017), and constructing meaningful careers and personal well-being (Eteläpelto, Vähäsantanen, Hökkä, & Paloniemi, 2013; O'Meara et al., 2011). Student agency is highlighted as a longstanding educational aim at the policy level (OECD, 2018), but the development of and prerequisites for agency have received little explicit attention in higher education. Trede, Macklin, and Bridges (2012) have claimed that universities focus on securing theoretical and formal knowledge but do not optimally prepare students for the world of work, which requires agency.

Several strands of higher education research are related to student agency, but they tend to focus on unitary aspects or constructs linked to individual's self-processes or beliefs (e.g., Busse, 2013; Schunk & Zimmerman, 2012; van Dinther, Dochy, & Segers, 2011) or learning relations and participatory structures (e.g., Eteläpelto, Littleton, Lahti, & Wirtanen, 2005; Lipponen & Kumpulainen, 2011). Furthermore, empirical studies on student agency in higher education have mainly used qualitative analyses (e.g., Damsa et al., 2010; Lipponen & Kumpulainen, 2011; for an exception, see Soini, Pietarinen, Toom, & Pyhältö, 2015). Studies focusing on epistemic agency emphasise knowledge construction in micro-level learning interactions (e.g., Damsa et al., 2010; Scardamalia, 2002) but pay little attention to students' judgements of their own individual prerequisites and the resources of agency set by teaching practices framing their learning. Thus,

knowledge of students' agency experiences and their links to teaching practices in higher education courses is needed to gain deeper insight into the factors and mechanisms of agency construction and agency-supportive practices.

A key factor in improving teaching and learning quality in higher education is student-centred learning (SCL), which encompasses active learning and its supportive practices (see e.g., Bechter, Dimmock, & Jackson, 2019; European higher education policy; EHEA, 2015; Hannafin, Hill, & Land, 1997; Kember, 2009; Lea, Stephenson, & Troy, 2003; Ramsden, 2003). Links between student agency and teaching practices allowing for and facilitating SCL are assumed in the literature, but these links are mostly implicit. Some studies have analysed students' taking of active and contributing roles in collaborative learning (e.g., Damsa et al, 2010; Oshima, Oshima, & Fujita, 2018), whereas some studies link student-centred assessment and feedback practices directly to student agency without providing a clear definition of the concept (e.g., Boud & Molley, 2013). Starkey (2017) sees student agency as the empowerment of students and links it to personalised and individualised student-centred education.

As far as we know, empirical research on the association between students' experiences of their agency in learning situations and teaching practices is scarce (for an exception see Toom, Pietarinen, Soini, & Pyhältö, 2017). In the present study, we focus on this question by utilising our previously developed conceptualisation of student agency, which captures the multidimensional nature of agency (Jääskelä et al., 2017), and applies a person-/subject-centred approach recently emphasised in both higher education and professional learning contexts (see e.g., Eteläpelto et al., 2013; Su, 2011). With respect to teaching practices, we pay attention to observable aspects of student-centred learning environments, particularly the instructional and relational affordances (e.g., activities, instructional practices, and roles) which allow students agentic roles in their

learning (e.g. Bechter et al., 2019; Elen, Clarebout, Léonard, & Lowyck, 2007; Starkey, 2017; Trinad, 2019).

1.1. The construct of agency in higher education

During the last decade, active interest in agency has arisen, especially in research on workplace and lifelong learning (Billett, 2007, 2008) and in constructivist and sociocultural conceptions of learning (Martin, 2004; Packer & Goicoechea, 2000). However, the origins of the construct of agency date back to the conceptualisations of agency in the *social sciences* as an individual's capability to engage in intentional, self-defined, meaningful, and autonomous action in circumstances constrained by power relations and structural, contextual factors (e.g., Archer, 2003; Foucault, 1975; Giddens, 1984). Within *social-cognitive psychology*, agency is seen as the mediating factor from thoughts to actions linked to both an individual's self-processes, intentionality, and self-reflection (e.g., Bandura, 2001), and self-efficacy and competence beliefs (Schunk & Zimmerman, 2012). Bandura (1986) perceives human agency as being inherently interactional: individuals' construct beliefs of their capabilities through social interaction and experiences in a context. The concept of learner autonomy has sometimes been used in parallel with the concept of student agency as they both include the idea of an individual desire or ability to take control over one's own learning (e.g., Benson, 2003). However, the concept of learner autonomy is seen to carry relatively strong connotations with self-directed and independent learning whereas agency includes the idea of a socially co-constructed and relational nature, which 'broadens and deepens the term autonomy by incorporating dependence, interdependence and engagement in a social world' (Hunter & Cooker, 2007).

Constructivist views on agency pay attention to an individual's active action in the construction and reorganisation of knowledge (Martin, 2004). Within collaborative learning research, the core of agency centres on shared epistemic agency, that is taking responsibility for both epistemic and regulative actions in knowledge construction and forming the capacity 'to be a productive participant' (e.g., Damsa et al., 2010). *Sociocultural views* emphasise that agency manifests itself as a power to act, make decisions, and take stances (see e.g., Vähäsantanen, 2015), but at the same time, that agency is resourced and constrained by contextual factors, such as power relations (e.g., Hökkä et al., 2017). Furthermore, agency is seen as relying on situational affordances, such as pedagogical practices facilitating role distribution and reciprocity between teachers and students (Lipponen & Kumpulainen, 2011). According to the *subject-centred sociocultural view* of agency (Eteläpelto et al., 2013), in addition to social and cultural structures, an individual's interpretations, meanings, and purposes for action are critical in any attempt to understand and foster agency. Similarly, within the higher education context, Case (2013) and Su (2011) have called for a person-focused approach which takes into account the affective and experiental aspects of agency.

Based on a synthesis of previous literature, our view of agency stresses the dynamic, contextually situated, and relationally constructed nature of agency (e.g., Edwards, 2005) while also acknowledging its subjective standpoint (see Emirbayer & Mische, 1998; Eteläpelto et al., 2013) and the interplay between resources and a person's capacities (e.g., rather than permanent or fixed capabilities). In our earlier work (Jääskelä et al., 2017), we developed a conceptualisation of student agency in the higher education context and a validated self-evaluation tool, the Agency of University Students (AUS) Scale, for measuring students' course-specific experiences of agency. We define student agency in higher education *as a student's experience of having access to or being empowered to act through personal, relational, and participatory resources, which*

allow him/her to engage in purposeful, intentional, and meaningful action and learning in study contexts (Jääskelä et al., 2017). This conceptualisation was based on an examination of key theoretical literature in social sciences, psychology, and educational sciences – particularly in the work-related learning context – and empirical analysis on data gathered using the first version of the AUS scale (Jääskelä et al., 2017). The following three domains of agency were specified: personal, participatory/contextual and relational resources. *Personal* resources capture aspects of self-efficacy (e.g., students' sense of having self-confidence as a learner; Bandura, 1989) and competence beliefs (e.g., sense that understand and having the competence needed to learn course content; e.g., Schunk & Zimmerman, 2012). *Participatory* resources refer to the set of factors that enable active and engaged participation, particularly, the experienced opportunities for participating, influencing and making choices, becoming interested in the course contents, and utilising peer support in the learning context (e.g., Edwards, 2005; Lipponen & Kumpulainen, 2011). Finally, *relational* resources comprise the aspects related to power relations in the learning context, particularly through the sense of equality among students and the experiences of trust and support from the teacher in learning situations (e.g., Eteläpelto & Lahti, 2008).

1.2 Links between student agency and teaching practices facilitating student-centred learning

Several pedagogical approaches (e.g., problem-based, exploratory, inquiry-based, discovery, project-based, cooperative, and participatory learning) have been introduced as ways to promote student-centred learning (SCL) via students' active involvement in the learning process (see e.g., Beaten, Kyndt, Struyven, & Dochy, 2010; Bechter et al., 2019). Conceptualisations of SCL have roots in both constructivist theorising (see e.g., Baeten et al., 2010; Hannafin & Hannafin, 2010) and humanistic traditions (Rogers & Freiberg, 1994, Tangey, 2014). Constructivist views, in

particular, have played an influential role in the conceptualisation of SCL and related teaching practices and learning environments in higher education (Brouwer, Jansen, Severiens, & Meeuwisse, 2019; Elen et al., 2007; Hannafin & Hannafin, 2010; Hannafin et al., 1997; Tangey, 2013). Lea, Stephenson and Troy (2003) use the term SCL to refer to students' active learning, which includes accountability, autonomy, and increasing one's understanding, but also includes a dialogic interdependence between teacher and student and a reflexive approach to learning. Furthermore, the terms 'student-centred approach' or 'student-centred education' are used in the literature to refer to teaching practices, pedagogies, or features in the learning environment supporting active learning processes (e.g., Bechter et al., 2019; Edwards & Thatcher, 2004; Hannafin et al., 1997; Lea et al., 2003; Rust, 2002; Starkey, 2017).

The following premises are seen to characterise teaching practices which support SCL in educational settings (c.f. Bechter et al., 2019; Land, Hannafin, & Oliver, 2012; Wright, 2011). First, the adoption of a student-centred approach requires a shift from externally driven instruction and authority (Hannafin, Land, & Oliver, 1999; McCabe & O'Connor, 2014) to the facilitation of student autonomy and ownership over one's own learning (Bechter et al., 2919; Kember & Gow, 1994; Lea et al., 2003). Second, hierarchical framing needs to be decreased in course implementation with a renegotiation of the roles of teacher and student and student involvement in decision-making concerning the pedagogical process (Bechter et al., 2019; Elen et al., 2007; (Harju & Åkerblom, 2017). Third, the students are encouraged to engage in active meaning-making and constructing a critical relationship with knowledge (van Aalst & Chan, 2007; Land et al., 2012) and harnessed with meaningful and motivating learning experiences through tasks that involve open questions (Land et al., 2012; Zeegers & Elliot, 2019), problem solving, and inquiry-based approaches (Bransford et al., 2006; Scardamalia, 2002; van Aalst & Chan, 2007). Fourth,

the students are offered interactive learning formats that allow for the collective advancement of knowledge construction (Damsa & de Lange, 2019; Scardamalia, 2002) and opportunities for feedback and dialogue (Hmelo-Silver & O'Donnell, 2013; Roschelle, 2013). Such learning is not seen as entirely self-directed (Kirschner, Sweller, & Clark, 2006), but it includes bi-directional feedback, guidance, and the co-creation of learning processes (Bechter et al., 2019; Lea et al., 2003). Finally, individualised learning is applied to empower students to monitor their learning and development (Bechter et al., 2019; Boud & Molley, 2013; Kember & Gow, 1994; Zimmerman & Schunk, 2011) through metacognition and self-assessment, thereby facilitating their professional development (Trede et al., 2012). This entails, for example, encouraging students to define their own learning needs and goals (Bransford et al., 2006).

These premises provided insights into our way of assessing teaching practices in university courses via student-perceived involvement in learning, student-teacher roles, and forms of instruction. Aligning with constructivist views (e.g., Lea et al. 2003; Bechter et al. 2019), we define SCL as active learning that constitutes knowledge construction and growth at personal level. The term 'active' refers to a student's contributing role in learning, for example, working with intellectual challenges both autonomously and collaboratively and setting personal goals and assessing one's learning.

When constructing a student-centred education framework, Starkey (2017) has explicitly included student agency as one of the three key dimensions to be fostered in student-centred education (see Figure 1). The first dimension emphasises an individual's *cognitive development* through active learning and the scaffolding role of teachers in fostering students' understanding and learning progression. The second dimension stresses students' *agency as empowerment* in terms of a sense of belonging through active participation, and a sense of control over one's

learning progress. Starkey (2017) links student agency development to participatory learning, self-reflection, and self-regulation. Starkey's (2017) third dimension of student-centred education underlines the learners' *unique personal preferences,* which, in student-centred education, means the support of students' interests, aspirations, and motivational needs for learning.

Starkey's (2017) views of student-centred education are in line with the views presented by Tangue (2013) and Su (2011), who endorse the constructivist base for SCL in higher education and, at the same time, call for a broader and more holistic understanding of students' possibilities and affordances for personal growth, empowerment, and lifelong learning. We see that our approach to student agency addresses this call. Similarly to Starkey (2017), we construe student agency as empowerment which is afforded via access to and employment of student-experienced resources. In line with Su (2011), we argue that in addition to *cognition* and *action,* person-centred aspects of agency which pay attention to *affective experiences* in learning are relevant for understanding students' agency development, because affective experiences are intertwined with knowledge- or action-based learning. Thus, it is imperative to gain insight on how empowered students perceive themselves through relations and participatory opportunities in the learning situation, and how their agency experiences are related to their perceptions of the teaching practices they encounter in their courses and learning tasks.

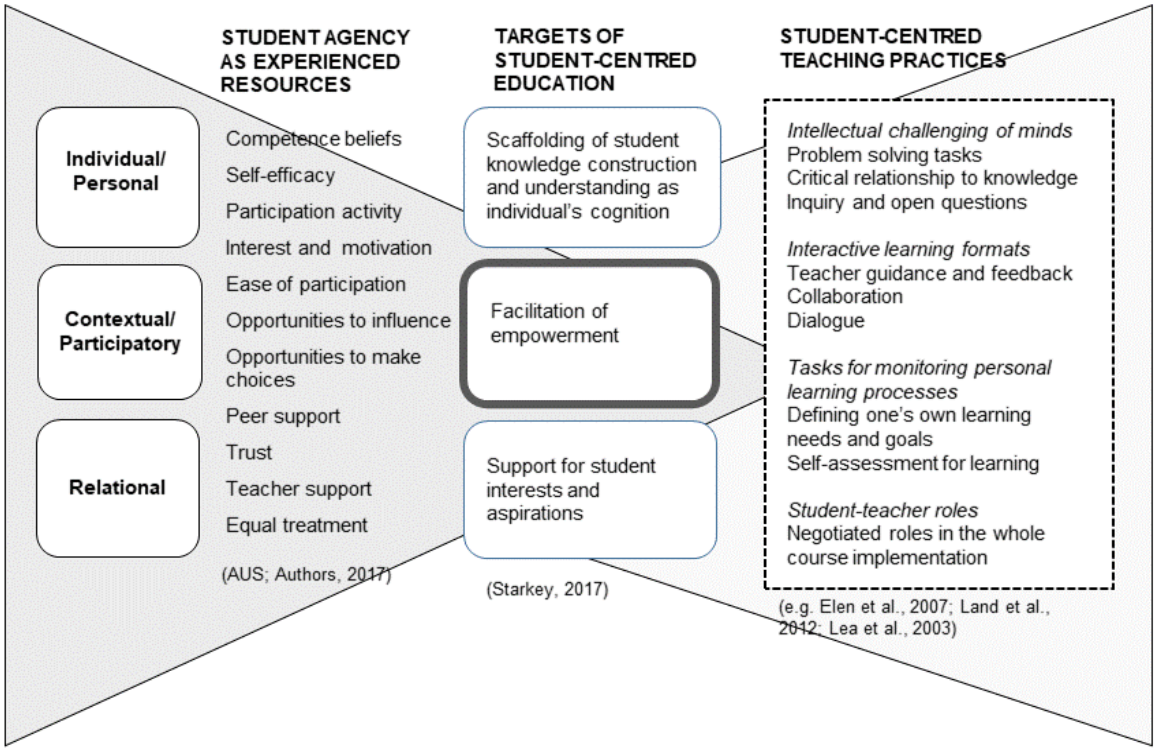

Fig. 1. The role of student agency in student-centred education.

1.3. The current study

In the present study a person-oriented methodological approach was applied to identify profiles of agency based on students' course-specific self-ratings using the AUS Scale (Jääskelä et al., 2017). Further, we examined whether the profiles were related to the students' perceptions of teaching practices in their courses. The following research questions were set:

1. How do university students perceive resources for agency in their courses?
2. What kinds of agency profile groups can be identified among the students?

3. Are students' agency profiles associated with their perceptions of the teaching practices used in their courses (i.e., student-centred learning activities, forms of instruction, and student-teacher roles)?

2. Method

2.1. Participants and data collection procedures

The participants comprised 270 Finnish university students (167 women; 102 men; data was missing for one person) from 10 courses. The students completed both the AUS Scale (Jääskelä et al., 2017) and the teaching practices questionnaires at the end part of their course. In responding to the items the students were asked to take the particular course that they attended as their point of reference. The students were enrolled in Master's degree programmes at a Finnish university in their respective fields, i.e., natural sciences, education, humanities, and sport and health sciences. The median number of respondents in the 10 courses was 11 (*SD* = 26.7, range = 4–79). The participants' mean age was 22.66 years (*SD* = 4.63, range = 18–55; missing data for two persons), and they had completed a median number of 68.52 credits at the university (*SD* = 82.45, range = 0–459; missing data for 34 participants). The data were collected as part of a university-level pedagogical development project aimed at promoting meaningful learning experiences. The teachers were asked to allocate a 30-minute session during the final lesson of their course for students to anonymously complete the online questionnaire.

2.2. Measures

2.2.1. The agency of university students

The data on course-specific agency were collected using the AUS Scale (Jääskelä et al., 2017), which had been validated on a separate sample of 239 students. The original AUS scale was comprised of 10 factors and 54 items. The factors included three to seven items that were rated using a five-point Likert scale (1 = *fully disagree*; 5 = *fully agree*). In the current study, an independent dataset was collected (n = 270), and, in the process, six new items were developed, constituting a total of 60 items. Two new items (e.g., Opportunities to share competences in the group) were created to strengthen the mutuality and sharing aspect of the factor of Peer support (c.f. Edwards, 2010). Four new items were created to assess students' perceived opportunities to influence the course (e.g., goal setting, working methods, assessment practices) and to make choices (e.g., between course content). In addition, items that loaded on the factors of Opportunities to influence and Opportunities to make choices were revised to clarify the semantic differences between the items.

Validation of the refined AUS Scale. To confirm the factor structure of the AUS in the new dataset with the added six items, a confirmatory factor analysis (CFA) was conducted using Mplus (version 7.01, Muthén & Muthén, 1998–2017). The CFA was constructed using 11 factors instead of the original 10, as the nine items that recorded Participation activity were relatively heterogeneous in content. Consequently, Participation activity was specified by dividing it into two factors: four items capturing the perceived ease of participation and five items capturing the intensity of participation.

Two items (Opportunities to select the way to complete the course, and Opportunities to influence the assessment practice of the course) were omitted from the final scale solution because they did not load on any of the factors. The parameters of the models were estimated with full information maximum likelihood (FIML) with robust standard errors (MLR estimator). The goodness-of-fit was evaluated using the root mean squared error of approximation (RMSEA) and standardized root mean square residual (SRMR) indicators, which are suggested to be the most practical indexes in models with as several variables and factors as it was case in the present study (see e.g., Beauducel & Wittmann, 2005; Raykov, 1998). Hu and Bentler (1999) have recommended that values below 0.06 for RMSEA and 0.08 for SRMR can be considered as indicating a good fit between the hypothesised model and the observed data. With these indicators, the CFA with 11 factors (set *a priori*, residuals allowed to correlate) resulted in an acceptable model fit [χ^2 (1529; n = 270) = 2527.96, RMSEA = 0.05, SRMR = 0.07].

The standardised factor loadings ranged between .36 and .87 (Appendix A), and all loadings were significant at $p < .001$. The correlations between the factors ranged between 0.22 and 0.92 (Appendix B). The final scale solution included 58 items and 11 factors (the reliability coefficients are shown in parentheses): Competence beliefs (seven items, e.g., Understanding of the course contents; α = 0.86); Self-efficacy (five items, e.g., Belief in one's ability to succeed in the course; α = 0.87); Equal treatment (three items, e.g., Equal treatment of students by the teacher; α = 0.68); Teacher support (five items, e.g., Teacher's friendly attitude towards students; α = 0.71); Trust (seven items, e.g., Experience of being able to trust the teacher; α = 0.85); Participation activity (five items, e.g., Asking questions and making comments; α = 0.87); Ease of participation (four items, e.g., Possibility to express thoughts without being ridiculed; α = 0.79); Opportunities to influence (seven items, e.g., Possibility to influence the course contents; α = 0.75); Opportunities

to make choices (three items e.g., Possibility to choose between various ways of completing the course; α = 0.70); Interest and utility value (seven items e.g., The course was not inspiring because of unclear utility value [revised item]; α = 0.85); and Peer support (five items e.g., Experiencing other students as resources for learning; α = 0.66).

We also conducted a second-order CFA on the data assuming three underlying latent factors, which provided an acceptable fit [χ^2 (1570; n = 270) = 2650.34, RMSEA = 0.05, SRMR = 0.08]. Standardised loadings of second-order factors ranged between .59 and .98 (Appendix C). All loadings were significant at p <. 001. Correlations between factors ranged from .44 to.75 (Appendix D). The three latent domains of agency were named as follows: (1) *personal* resources (two factors; Competence beliefs and Self-efficacy); (2) *relational* resources (three factors; Equal treatment, Teacher support, and Trust); and (3) *participatory* resources (six factors; Participation activity, Ease of participation, Opportunities to influence, Opportunities to make choices, Interest and utility value, and Peer support). In the present analyses, however, the decision was made to use the 11 original factors rather than the second-order factors because the former were seen to be theoretically more informative with respect to differences between the profile groups.

2.2.2. Teaching practices

Teaching practices in the courses were measured using students' ratings of (1) the student-centred learning activities (SCLA), (2) forms of instruction (FI) and (3) student-teacher roles (STR) in the course that they attended.

In the SCLA Scale, the students were asked to respond to 12 items using a four-point Likert scale (1 = *not at all*, 2 = *rarely*, 3 = *sometimes*, and 4 = *a lot*). The items were developed based on features of SCL environments depicted in the literature (e.g., Bransford et al., 2006; Boud &

Molley, 2013; Land et al., 2012; van Aalst & Chan, 2007). The items aimed to capture observable learning activities related to: (a) intellectual challenging of students' minds (e.g., Inquiry based learning and open questions); (b) interactive learning formats (e.g.,Working with other students); and (c) monitoring of personal learning (e.g., Self-assessment of one's own learning) (see Fig. 1). The factor structure of the scale was first examined with exploratory factor analysis (EFA), and the final model was estimated using CFA. The EFA supported a one-factor solution with 10 items, and further analysis with CFA required freeing of six residual correlations to achieve a good model fit [χ^2 (29; n = 270) = 43.12, RMSEA = .042, SRMR = .033] (Appendix E). All loadings were significant at $p \leq .001$. Cronbach's alpha reliability for the SCLA Scale score with 10 items was 0.86.

Forms of instruction (FI) used in the course were examined by asking the students to rate eight items (e.g. one-way teaching, dialogic teaching, small group discussions, larger group assignments, individual tasks) on a four-point scale (1 = *not at all*; 4 = *a lot*). The items were constructed both based on the literature concerning the forms of instructional practices typically used in different disciplines (e.g., Lueddeke, 2003; Neumann, Parry, & Becher, 2002) and based on the descriptions of expert teachers regarding the representative forms of instruction used in their disciplines. The eight items were used as independent variables in the analyses.

Third, *student-teacher roles* (STR) were examined using one multiple-choice item. Students were asked to choose one response from four options that described their perception of the student and teacher distribution of responsibility in the course. These response options were constructed based on the literature (e.g., Elen et al., 2007; Lea et al., 2003; McCabe & O'Connor, 2014). The four response options included the following: (a) the teacher managed the course and assessed the achievement of learning outcomes while the students complied with the instructions; (b) the

teacher had a clear role as the course manager and supervisor of learning, acting interactively with the students in modifying the course per the students' learning needs, while the students' role was to engage in working and the self-assessment of learning; (c) the teacher and students participated together in defining the aims and assessing the learning outcomes while the students were afforded expert and peer instruction roles; and (d) the students' role was to self-define the learning aims, choose the working methods, and self-assess their learning while the teacher's role was to offer support.

2.3. Analyses

First, the descriptives of the 11 factors (referred to as dimensions in the results) of the AUS Scale were calculated. The differences between the mean values were studied with t-tests of paired samples utilising SPSS (version 24).

Second, latent profile analysis (LPA) was applied to identify agency profile groups based on the 11 factors scores of the AUS. LPA is a model-based method estimating the parameters for mixture of normal distributions for certain number latent classes, and it gives posterior probability for individuals to belong each of the latent classes (Vermunt & Magidson, 2002). The goal is to identify the smallest number of latent groups that adequately describe the associations among the observed continuous variables. These analyses were conducted using Mplus (version 7.3, Muthén & Muthén, 1998–2017). The optimal number of latent profile groups was evaluated using the Bayesian Information Criterion (BIC), and adjusted Lo-Mendell-Rubin (LMR) likelihood ratio tests, and theoretical considerations. From the information criteria available in MPlus BIC was used because of its suitability for small sample size, and LMR test was chosen to complement this information (Nylund, Asparouhov, & Muthén, 2007; Tolvanen, 2007). The smaller the BIC value

is, the better the model fit is. Regarding to likelihood ratio test (LMR), a significant ($p<.05$) value indicates that the estimated model provides a better fit to the data than the model with one fewer group. In addition, the following elements were taken into consideration: classification quality, and the usefulness and interpretability of the latent classes. Classification quality was evaluated with average latent class probabilities (i.e., average posterior probabilities, AvePP) and entropy. AvePP and entropy values range between zero and one. The higher the values of AvePP and entropy are, the more distinctive the classes are.

For further analysis individuals were set to the class they most likely belong. This is justifiable because of high AvePP. Next, One-way ANOVA tests were conducted in SPSS to compare the identified profiles with respect to factor scores of the AUS. In addition, a chi-square test and one-way ANOVA were used to analyse the differences between the profile groups regarding student ratings on the three scales of teaching practices (SCLA, FI, and STR).

3. Results

3.1. Descriptive statistics of student agency

Table 1 shows that, at the total sample level, the agency scores were high, especially for the dimensions in the personal and relational domains, with mean values over 4.0 (ranging from 4.05 for Competence beliefs to 4.62 for Teacher support). The means for dimensions in the relational domain were statistically significantly higher than those of the dimensions in the personal domain. The means for the dimensions of Opportunities to make choices (M = 2.99; SD = 0.89) and Opportunities to influence (M = 3.15; SD = 0.66) were typically the lowest and were statistically significantly lower than the means of most other dimensions.

Table 1

Total sample means and standard deviations for the dimensions of agency.

	Individual resources		*Relational resources*			
Dimensions	1 Competence beliefs	2 Self-efficacy	3 Equal treatment	4 Teacher support	5 Trust	
M	4.05[a]	4.10[a]	4.35	4.62	4.44	
SD	0.68	0.71	0.65	0.50	0.54	
	Participatory resources					
Dimensions	6 Participation activity	7 Ease of participation	8 Opportunities to influence	9 Opportunities to make choices	10 Interest and utility value	11 Peer support
M	3.29	3.83[cd]	3.15	2.99	3.80[bc]	3.75[bd]
SD	0.98	0.79	0.66	0.89	0.76	0.72

Note. Mean values are based on 270 respondents for each factors, there are not missing data. The means with same subscript do not differ significantly ($p > .05$).

Correlations between the 11 dimensions (see Appendix B) were mainly statistically significant, ranging between .22–.89. Self-efficacy and Competence beliefs, both representing the individual resources domain, correlated highly ($r = .83$). In addition, high correlations emerged between Teacher support, Equal treatment, and Trust ($r = .88–.92$), representing the relational resources of agency. In the domain of participatory resources, correlations between the dimensions ranged between .34–.81. The correlations were the lowest between Opportunities to make choices and Ease of participation.

3.2. Latent profiles of agency

The results from the series of LPAs (see Table 2 for fit indices) showed that the BIC values decreased when additional latent classes were added and thus indicated a better fit between the model and the data (Nylund, Asparouhov, & Muthén, 2007). The LMR tests favoured the three-class solution ($p < 0.05$) over the four-class solution. The five-class solution was excluded based

on the LMR tests and an inspection of group sizes (suggesting a low group size for Profile 1). Based on the statistical indices, the interpretability of the latent classes, and the inspection of group sizes, the four-class solution was selected for further analyses; moreover, it showed high values (0.98, 0.90, 0.90, 0.94) for the average posterior probabilities of group membership. The entropy value for the four-class solution (0.85) was also relatively high.

Table 2

Information criteria values for different class solution.

Number of profiles	BIC	Entropy	LMR	n Profile 1	n Profile 2	n Profile 3	n Profile 4	n Profile 5
1	8551.660	-	-	270				
2	7885.861	0.880	0.001	165	105			
3	7594.456	0.881	0.001	39	119	112		
4	7558.811	0.851	0.062	39	104	74	53	
5	7537.026	0.867	0.271	11	33	69	103	54

Note. BIC = Bayesian Information Criteria; LMR=Lo–Mendell–Rubin likelihood ratio test, p-value.

The profile groups were labelled as follows: (1) *Lower than average agency* (LA), (2) *Average level agency* (AA), (3) *Average with low participatory agency* (ALPA) and (4) *Higher than average agency* (HA). The four profiles with their standardised means are shown in Fig. 2.

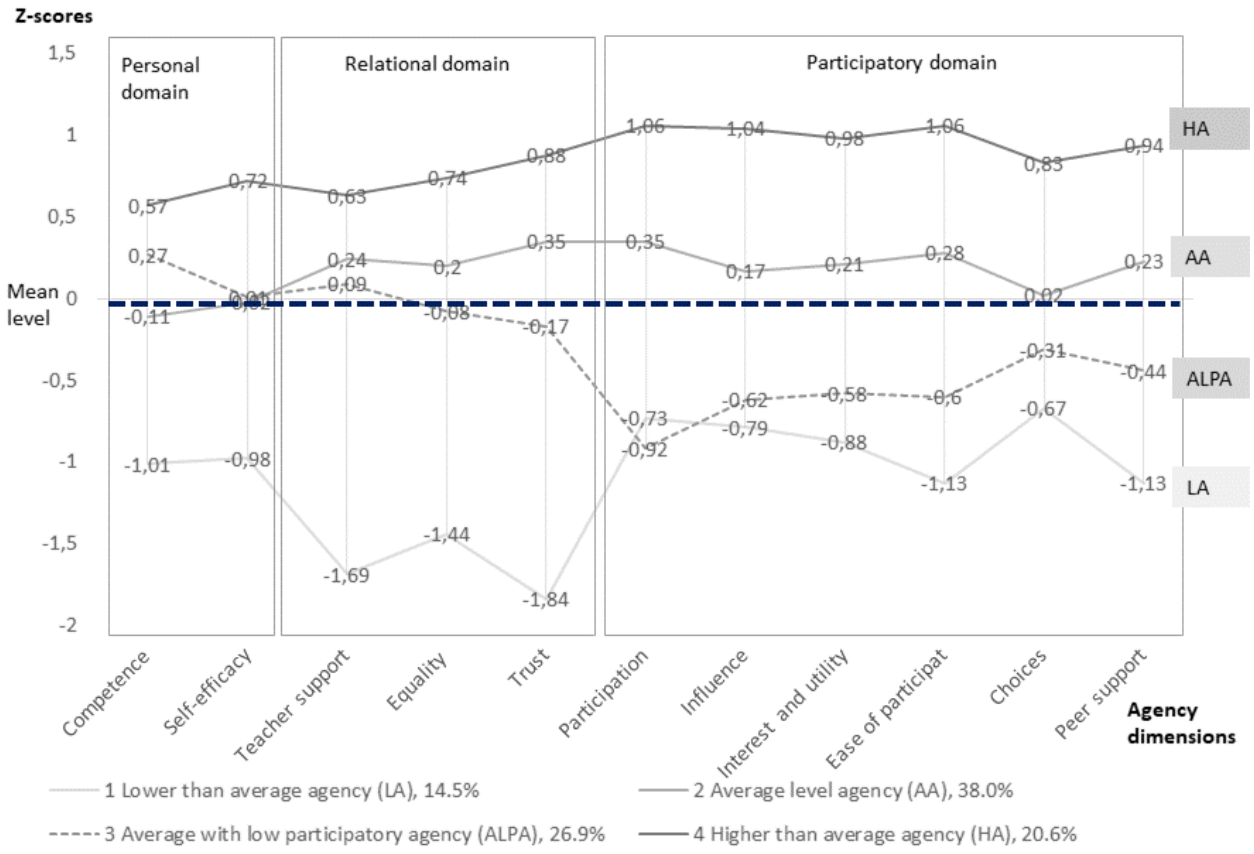

Fig. 2. Agency profiles among students according to dimensions and domains

The ANOVA (Bonferroni corrected) results (see Table 3) indicated that the profile groups were distinct; all four profiles statistically significantly differed in the dimensions of Trust, Ease of participation, and Peer support. In addition, profile groups 1 (LA), 2 (AA), and 4 (HA) showed statistically significant differences from each other in all dimensions, whereas profile group 3 (ALPA) did not always differ from the other profiles.

Table 3

Results of the one-way analysis of variance comparing the profile groups.

	Profile 1 *n*=39	Profile 2 *n*=104	Profile 3 *n*=74	Profile4 *n*=53		Total sample *n*=270
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*F (3, 266)*	*M (SD)*
Personal resources						
Competence	3.34[a] (0.71)	3.96[b] (0.63)	4.23[c] (0.57)	4.47[c] (0.44)	30.56***	4,05 (0,68)
Self-efficacy	3.40[a] (0.83)	4.09[b] (0.64)	4.09[b] (0.59)	4.64[c] (0.37)	30.26***	4,10 (0,71)
Relational resources						
Teacher support	3.79[a] (0.56)	4.75[b] (0.32)	4.67[b] (0.34)	4.96[c] (0.88)	97.12***	4,62 (0,50)
Equal treatment	3.40[a] (0.56)	4.48[b] (0.51)	4.30[b] (0.53)	4.84[c] (0.30)	68.30***	4,35 (0,65)
Trust	3.44[a] (0.40)	4.64[b] (0.30)	4.34[c] (0.30)	4.92[d] (0.13)	220.47***	4,44 (0,54)
Participatory resources						
Participation activity	2.59[a] (0.84)	3.65[b] (0.55)	2.37[a] (0.65)	4.38[c] (0.50)	137.77***	3,29 (0,98)
Opportunities to influence	2.64[a] (0.61)	3.27[b] (0.48)	2.74[a] (0.47)	3.85[c] (0.51)	66.39***	3,15 (0,66)
Interest and utility value	3.14[a] (0.74)	3.98[b] (0.52)	3.34[a] (0.66)	4.55[c] (0.36)	66.98***	3,80 (0,76)
Ease of participation	2.94[a] (0.66)	4.07[b] (0.49)	3.36[c] (0.64)	4.69[d] (0.25)	110.89***	3,83 (0,79)
Opportunities to make choices	2.39[a] (0.76)	2.99[b] (0.80)	2.73[ab] (0.80)	3.78[c] (0.73)	28.37***	2,99 (0,89)
Peer support	2.95[a] (0.57)	3.93[b] (0.53)	3.41[c] (0.63)	4.44[d] (0.36)	71.89***	3,75 (0,72)

Note. The pairs with same subscript letters do not differ significantly (p>.05) based on ANOVA post hoc (Bonferroni corrected) paired comparisons.

3.2.1. Profile 1: Lower than average agency (LA)

Profile group 1 (LA; 39 students, 14.5%) had scores below the sample means in all 11 dimensions of agency (see Table 3). The differences between the LA profile and the other profiles were shown especially for Trust (z*M* = -1.84), Teacher support (z*M* = -1.69), and Equal treatment (z*M* = -1.44), all of which represent relational resources (see Fig. 2). Students in the LA profile group rated their personal resources lower than the sample means on average in Competence beliefs (z*M* = -1.01) and Self-efficacy (z*M* = -0.98) as well as in dimensions representing participatory resources, particularly Ease of participation (z*M* = -1.13) and Peer support (z*M* = -1.13). The LA profile also statistically significantly differed from the other profiles, except for profile 3 in four dimensions, by scoring lower in the personal and relational domains as well as in the participatory domain.

3.2.2. Profile 2: Average level agency (AA)

The second profile group (AA; 104 students, 38.0%) attained scores close to the sample means in all 11 dimensions of agency. This group did not differ statistically from profile group 3 in the dimensions of Teacher support, Equal treatment, or Opportunities to make choices.

3.2.3. Profile 3: Average with low participatory agency (ALPA)

The third profile group (ALPA; 74 students, 26.9%) demonstrated scores close to the sample means in most of the dimensions of the personal and relational domains. However, the ALPA profile differed significantly from the LA and AA profiles in the dimension of Competence beliefs. Moreover, in Self-efficacy, Teacher support, and Equal treatment, the ALPA profile differed significantly from the LA and HI profiles but not from the AA profile. Regarding participatory

resources, students belonging to the ALPA profile were below the sample level in all dimensions; Participation activity (z*M* = -0.92) and Opportunities to influence (z*M* = -0.62) attained the lowest scores in relation to the sample level.

3.2.4. Profile 4: Higher than average agency (HA)

The fourth profile (HA; 53 students, 20.6%) demonstrated scores above the sample means in all 11 dimensions of agency (see Table 3). The scores of the HA profile were especially high (*M* = 3.78–4.69) in the dimensions representing participatory resources: Participation activity (z*M* = 1.06), Opportunities to influence (z*M* = 1.04), Interest and utility value (z*M* = 0.98), Ease of participation (z*M* = 1.06), Opportunities to make choices (z*M* = 0.83), and Peer support (z*M* = 0.94) (see Fig. 2). Scores in the relational domain were also high in all dimensions, particularly Teacher support (*M* = 4.96; *SD* = 0.88), and were all above the sample level: Teacher support (z*M* = 0.63), Equal treatment (z*M* = 0.74), and Trust (z*M* = 0.88). The HA profile differed significantly from the other profiles in all dimensions of relational and participatory resources and in the dimension of Self-efficacy. However, in Competence beliefs, the HA profile differed from the LA and AA groups but not from the ALPA group.

3.3. Comparison of agency profiles with respect to student-perceived teaching practices

3.3.1. Student-centred learning activities

The ANOVA tests showed differences between the profile groups for perceived SCLA [F (3, 266) = 70.53, $p < .001$]. The univariate follow-up comparisons (using Bonferroni tests) indicated that students in the LA profile (*M* = 2.18; *SD* = 0.61) rated course-specific SCLA the lowest, and students in the HA profile (*M* = 3.23; *SD* = 0.61) rated course-specific SCLA the highest compared

to the other groups (see Table 4). The profile groups differed from each other concerning SCLA except for LA and ALPA groups, which did not differ from each other.

Table 4

Comparison of the profile groups on mean value of student-centred learning activities (SCLA).

Profile groups	*n*	*M* (*SD*)	*Min.*	*Max.*	*Pairwise comparisons*
1. Lower than average agency (LA)	39	2.18 (0.61)	1.20	3.50	1< 2, 4
2. Average level agency (AA)	104	2.85 (0.44)	1.60	3.80	1, 3<2<4
3. Average with low participatory agency (ALPA)	74	2.24 (0.46)	1.00	3.20	3<2, 4
4. Higher than average agency (HA)	53	3.23 (0.31)	2.50	4.00	4>1, 2, 3

Note. The pairwise comparisons column shows which group differences are statistically significant at p <.05 (with Bonferroni correction). One-way ANOVA F(3, 266) = 70.53, p < .001.

3.3.2. Forms of instruction

Statistically significant differences (p < .05) between the profile groups were also found for forms of instruction (FI). Table 5 indicates that the LA and ALPA groups differed from the HA profile most clearly regarding interactive FI. In the HA profile, dialogic teaching, mapping views of the study group, small group discussions, group assignments, and sharing of knowledge were used more often than in the LA profile. The mean scores were all generally above the average level in the HA profile, whereas, in the LA profile, the mean scores were below the sample level. In the ALPA profile, interactive FI were used to a lesser extent than in the LA and HA profiles. One-way lecturing was reported as a more frequent form of instruction in the ALPA profile (*M* = 3.42; *SD* = 0.93) than in the AA (*M* = 2.77; *SD* = 1.01) or HA (*M* = 2.68; *SD* = 0.87) profiles.

Table 5

Results of the one-way analysis of variance comparing the profile groups on forms of instruction used in the courses.

	Profile 1 (LA) *n* = 39	Profile 2 (AA) *n* = 104	Profile 3 (ALPA) *n* = 74	Profile 4 (HA) *n* = 53		Total sample *n* = 270
FI	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*F (3, 266)*	*M (SD)*
1. One-way teaching	3.00 (1.15)	2.77^{a} (1.01)	3.42^{ab} (0.93)	2.68^{b} (0.87)	8.20***	2.96 (1.02)
2. Dialogic teaching (directed by the teacher)	2.69^{abc} (0.77)	3.29^{a} (0.63)	3.07^{b} (0.69)	3.36^{c} (0.79)	8.76***	3.16 (0.73)
3. Mapping of views of the whole study group	2.15^{a} (0.87)	2.34^{b} (0.93)	2.10^{c} (0.80)	2.91^{abc} (0.90)	9.63***	2.36 (0.93)
4. Small group discussions (e.g. sharing views)	2.95^{ab} (0.86)	3.33^{a} (0.70)	3.14 (0.67)	3.45^{b} (0.72)	4.63**	3.25 (0.74)
5. Larger group assignments, broader tasks given by the teacher	2.36^{a} (1.16)	2.66^{b} (1.08)	1.96^{bc} (1.09)	3.04^{ac} (1.07)	11.21***	2.50 (1.15)
6. Individual tasks related to teaching (e.g. pre-tasks)	2.92 (0.77)	3.10 (0.82)	2.89^{a} (0.62)	3.32^{a} (0.85)	3.7**	3.06 (0.78)
7. Participatory sharing of knowledge/expertise	1.85^{ab} (0.90)	2.47^{ac} (1.04)	1.85^{cd} (0.93)	2.77^{bd} (1.03)	12.70***	2.27 (1.05)
8. Functional or experimental working methods	1.59^{ab} (0.90)	2.14^{ac} (1.03)	1.20^{cd} (0.50)	1.89^{bd} (1.11)	25.51***	1.89 (1.04)

Note. **$p \leq .01$, ***$p \leq .001$. Superscript letters denote statistically significantly ($p < .05$) differences based on ANOVA post hoc (Bonferroni corrected) paired comparisons. LA = Lower than average agency; AA = Average level agency; ALPA = Average with low participatory agency; HA = Higher than average agency

3.3.3. Student-teacher roles

The results of the chi-square tests showed a significant difference in profile group membership [$\chi^2(8, 266) = 55{,}85$, $p <. 001$] with respect to students' perceptions of the roles of teachers and students in the course implementation. Students who perceived the teacher as a manager and themselves as having an accountable role were overrepresented in the LA (56.4%, adjusted residual = 3.4) and the ALPA (47.3%, adjusted residual = 3.1) profiles, but they were underrepresented in the AA (23.8%, adjusted residual = -2.4) and HA (11.5%, adjusted residual = -3.6) profiles. Those students who perceived student-teacher relations in the courses as participating interactively (option b) or joint participation (option c) between teachers and students in their courses were overrepresented in the HA profile (40.4%, adjusted residual = 4.3) but underrepresented in the ALPA profile (4.1%, adjusted residual = -3.9).

4. Discussion

Despite the widely acknowledged role of agency in expert work and professional development (e.g., Goller & Paloniemi, 2017; Collin et al., 2018), empirical research on the prerequisites and resources of student agency in the higher education context is scant. Furthermore, as emphasised in the literature (e.g., Case, 2013; Eteläpelto et al., 2013; Su, 2011), knowledge of agency as personal experiences and judgements is needed to better understand the development of agency and contextual factors supporting or restricting it. This study is among the very first to apply a person-oriented approach to examine profiles of university students' agency with respect to student-perceived teaching practices, particularly student-centred learning activities (SCLA), forms of instruction (FI), and student-teacher roles (STR) in the courses that the students attended. Our aim was to gain a holistic picture of students' experiences of agency and the teaching practices

associated with them. Four distinct student agency profiles were identified in the data: (1) *Lower than average agency* (LA); (2) *Average level agency* (AA); (3) *Average with low participation* (ALPA); and (4) *Higher than average agency* (HA). Moreover, differences emerged between the agency profiles in terms of students' perceptions of teaching practices in the courses which suggested associations between students' experience of high agency resources and teaching practices supporting students' active learning and participatory role in the pedagogical process.

On average, the students of this study experienced their relational resources of agency higher than personal or participatory resources in their respective courses. The mean values were high with respect to the dimensions reflecting teacher-student relationship (Teacher support, Trust for the teacher, and Equal Treatment), suggesting that the students perceived their teachers as emotionally supportive and their learning environment as safe and encouraging, and that they experienced being treated equally by the teacher. Previous literature maintains that agency is critically dependent on the quality of teacher-student interaction (Toom et al., 2017), social support (Sannino, 2010), learners' mutual power relations (Eteläpelto et al., 2005), and experiences of trust, and the creation of a permissive and emotionally safe climate (Juutilainen et al., 2018; Eteläpelto & Lahti, 2008; Hökkä et al., 2017). Moreover, positive teacher-student relationships have been shown to be associated with high student engagement in learning activities (Xerri, Radford, & Shacklock, 2018) and successful learning outcomes (Cornelius-White, 2007). In light of these previous studies, our findings of a high level of relational resources in the total sample suggests that, for the majority of the students, the teacher-student relations prevailing in their courses offered experiences of agency which can favourably contribute to their motivation and success in the course.

However, further analysis of this study revealed that the students were not a homogenous group in terms of the experiences of relational resources. Although most students (i.e., those belonging to the AA, ALPA, and HA profiles) provided high ratings on trust for the teacher, and support and equal treatment by the teacher, students in the LA profile provided low ratings on these same dimensions. Furthermore, along with Ease of participation and Peer support, the dimension of Trust for the teacher differentiated strongly between all the profile groups. This suggests that differences between the profiles groups are largely due to the extent to which students feel secure, experience a low emotional threshold for participation (i.e., they dare to participate), and perceive being supported by fellow students. Similarly, in an interview study focusing on teacher students' agency in collaborative learning groups, emotional safety and support from both peers and the teacher emerged as prominent facilitators of students' agency (Juutilainen, Poikkeus, & Metsäpelto, 2018).

A subgroup of particular concern is the LA profile group, which showed a contrasting level of agency – especially in comparison to the HA profile – in all three resource domains and the respective 11 dimensions of agency measured in this study. The students belonging to the HA profile group perceived their resources of agency as significantly higher than students in the LA profile group. This could indicate a risk of 'falling behind' for students in the LA who more often than others experienced the course contents as too challenging, reported lacking basic knowledge required in the course more often, and were not confident about succeeding well in the course. Furthermore, the students in the LA profile group experienced their relational resources as less supportive than students in the other profiles. Their relatively low ratings of participatory resources of agency suggest fewer opportunities for active participation, peer support and having an influence in their course. Even though we did not have the opportunity to analyse the association

between students' agency experiences and their study success in the present data, some links can be presumed based on our analyses with other data collected using the same measure, the AUS scale, in another sample (Jääskelä et al., 2020). In that study, a statistically significant association was found between students' agency experiences and their course grade, indicating that students who assessed their resources of agency as high in most dimensions of agency were more likely to receive better grades in the course. It has been argued (Heikkilä, Iiskala & Mikkilä-Erdmann (2020) that if students perceive their agency as constantly restricted or limited, the transformative learning process which allows students to become conscious of their specific capacities may partly remain unrecognisable to them which, in turn, can have an unfavourable impact on their professional agency at work.

Another interesting subgroup is the students in the ALPA profile, who perceived their personal resources (including the dimensions of self-efficacy and competence beliefs) as surprisingly high in contrast to their lower than average ratings of participatory resources of agency. According to the review by Goller (2017), strong self-efficacy beliefs are related to individuals' agency in terms of taking on more challenging goals, and committing to reach desired goals even in the face of obstacles and failures. The agency profile of the ALPA group may reflect goal orientations according to which students see their skills as sufficient for achieving success in the course, but at the same time, do not place a high value on active course participation due to their mastery-extrinsic rather than mastery-intrinsic goal orientations (see Grant & Dweck, 2003; Pintrich, 2003; Pulkka & Niemivirta, 2013). Moreover, in our preliminary further analysis, we noted that the ALPA group profile is somewhat more prevalent in courses with a relatively big enrolment (more than 40 students), which tend to utilise teacher-directed instructional practices such as lecturing and predetermined tasks for students.

Students who experienced higher than average agency (HA) reported more often use of student-centred learning activities in their courses than the students who reported a lower overall agency (LA). Moreover, a higher percentage of students in the HA group than in the LA group indicated that participatory forms of instruction were typically used in their course. Finally, students who perceived the role distribution between the teacher and students in their courses as interactional or egalitarian rather than teacher-dominated were overrepresented in the HA profile group. These results suggest that the students who rated the extent of student-centred learning activities in their course as high also more typically felt that they could influence the course and take an active role in learning situations. Furthermore, the students belonging to the HA profile group experienced higher interest in the course contents and a higher utility value than other profile groups, and also found the other students supportive of their learning. They also expressed higher competence in mastering knowledge required in the course and had prior beliefs of successfully completing the course. Moreover, they felt that they were equally treated and emotionally supported by the teacher.

In line with the present findings a few prior studies have provided evidence on the positive impact of interactive and collaborative forms of instruction on student agency. Lipponen and Kumpulainen (2011), for example, concluded that a learning environment in which teachers construct interactional spaces for learning without imposing tight control can support student agency. This is done by allowing students to take initiatives and change the course of actions in lessons or study units. Moreover, the studies by Moate and Ruohotie-Lyhty (2014) and Toom et al. (2017) suggest that student agency can best be developed in learning environments which support active learning and invite students' collaboration in solving problems and reflection. In agreement with this literature, our findings imply that teacher practices that allow for students'

contribution to the pedagogical process and foster collaboration and student engagement in learning activities can enhance students' sense of being resourced and having the capacity to practice agency in their studies. This is especially evident in our study among the students in the HA profile, who seemed to experience high agency across all dimensions and saw their courses as containing a high extent of student-centred and participatory forms of learning.

In the LA and ALPA profile groups, the students' perceptions of the extent of student-centred learning practices in the course contrasted with the HA profile group's perceptions. Previous studies have acknowledged that students may have highly varying perceptions and interpretations regarding teaching practices, and they may respond differently to the same opportunities in a course (e.g., Edwards, 2015; Evans, 2013; Harris, Brown, & Dargusch, 2018). On the other hand, researchers of student motivation (e.g., Järvelä & Niemivirta, 2001; Pulkka & Niemivirta, 2013) have noted that students' motivational mindsets may mirror their evaluations of learning and instruction and may act as a moderator for teaching practices. In their narrative analysis on student teachers' agency, Heikkilä et al. (2020) noted that students vary from one other in how they position themselves in learning situations, ranging from taking self-protective stances to choosing to be open to challenges. In the development of student agency, the teacher and fellow students are likely to play an important role in facilitating students' reposition by encouraging them to face challenges and practise active agency (see Edwards, 2017).

4.1. Practical implications and future directions

In order to support student agency in higher education institutions, several different types of actions and approaches are likely to be necessary. Even though the promotion of student agency is stated in higher education policies and can typically be found in mission statements of higher

education institutions' strategies, more explicit attention to agency is needed in curriculum work, the planning of initial and in-service teacher training, and actual teaching and learning practices. Our study stresses the importance of increasing both teachers' and students' awareness of student agency as a multidimensional phenomenon in learning situations. Both educators and students need practical tools for evaluating the affordances of agency, for example, information about factors or structures that support or restrict it. Moreover, research-based, long-term initiatives are needed at the institutional level and within and across units to develop agency-supportive practices and a deeper understanding of the dynamics involved in the construction of agency.

The findings of this study strongly point out the relevance and need for teaching practices which afford students opportunities for choice and influence in their coursework. Workshops for sharing ideas among teachers and students of different disciplines on how to foster participatory resources of agency could be useful. Discussion among teachers and students concerning students' own learning goals within the scope of the learning objectives of a course would also help to make students' participatory and influential opportunities more transparent.

As evidenced by the profile group with overall low agency (LA), low agency is linked with lower ratings given in the relational domain for some students. This challenges teachers to convey genuine interest in dialogue with students, for example, by expressing concretely how and in what matters the teacher can be approached and that they are open to students' initiatives. Other relevant teacher competences are sensitivity and responsiveness to group dynamics, putting in effort to facilitating interaction, and ensuring equal treatment and a safe climate. These qualities of teacher-student relationships are likely to be critical for students reaching their full potential as well as perceiving and manifesting agency in learning situations.

In order to increase students' awareness of their own agency and its growth during their studies, tools are needed for collecting and reporting data on students' agency experiences and learning contexts. Information on student agency profiles can aid in developing pedagogical practices as well as providing valuable feedback to the students themselves. Learning analytics can be utilised to identify the resources and contexts most conducive for enhancing students' agency and control of their own learning (Ferguson, 2012, see also Jääskelä et al., 2020). Moreover, measures such as the AUS scale can be utilised in the study programs as tools for agency support and pedagogical development.

4.2. Limitations

The data were collected in courses in which the teachers were engaged in developing their pedagogy in a university-level project. This may have influenced the results concerning students' agency experiences as well as their perceptions of the teaching practices in the courses. To obtain a picture of the agency of the student population at the university level, courses should optimally be selected using a random sample. It is also important to be aware of limitations concerning quantitative measurement tools – in this case, structured questionnaires – in studying agency experiences and perceived teaching. The AUS scale is a relatively long instrument with 60 items in total which may have had an effect on the participants' response accuracy. Furthermore, student-teacher roles were studied by only one multiple-choice item. To obtain detailed knowledge of both agency and teaching practices in future studies, a mixed methodology that carefully combines focused qualitative data collection and quantitative data would be beneficial.

4.3. Conclusions

The present study adds a unique contribution to the research literature on agency by focusing on student profiles as well as their relation to student-perceived teaching practices. The study also contributes to the development of measurement tools for assessing agency and teaching practices, particularly student-centred pedagogy in higher education. The findings showed that the students who experienced high levels of agency also perceived their courses as more student centred. Taken together, the findings suggest that including interactivity and involving students in the pedagogical process – from goal setting to assessment – can be a positive force in students' construction of their agency in their studies. Investigating student agency by employing various dimensions and a person-oriented profile analysis approach in higher education can aid an understanding of the factors impacting students' sense of agency in learning situations; this, in turn, can contribute to the development of educational practices that foster student agency.

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Declaration of interest statement

No conflict of interest was reported by the authors.

Appendixes A.-E. Supplementary data.

Appendix A. Standardised factor loadings based on the final confirmatory factor analysis (CFA) for the AUS Scale.

Appendix B. Correlations between factors of the AUS Scale.

Appendix C. Standardised factor loadings based on the final second-order confirmatory factor analysis (CFA) for the AUS Scale.

Appendix D. Correlations between second-order factors of the AUS Scale.

Appendix E. Factor loadings based on the EFA's one-factor solution for the SCLA Scale.

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Appendix A

Standardised factor loadings based on the final confirmatory factor analysis (CFA) for the AUS Scale.

	CFA factor loadings										
Abbreviated items in the order of factors and their loadings	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
Competence beliefs											
1. Understanding of the course contents.	.862										
2. Experiencing course contents as too challenging. a	.722										
3. Sufficient basis for participation in discussions in the course.	.718										
4. Understanding of the constructs presented in the course.	.710										
5. Course demands have not been excessive.	.679										
6. Lacking basic knowledge for understanding the course contents. [a]	.523										
7. Experience of a need for revision of basic concepts prior to the course. [a]	.519										
Self-efficacy											
8. Belief in one's ability to succeed in the course.		.792									
9. Belief in succeeding even in the most challenging tasks.		.785									
10. Belief in successfully completing the course.		.780									
11. Confidence in oneself as a learner in spite of challenges.		.715									
12. Belief in attaining personal goals set for the course.		.649									
Equal treatment											
13. Equality among students.			.809								
14. Equal treatment of students by teachers.			.722								
15. Other students have a stronger influence on the course. [a]			.498								
Teacher support											
16. Teachers' friendly attitude towards students.				.739							
17. Belittling of students by teachers. a				.628							
18. Experience of being oppressed as a student. [a]				.588							
19. Not enough room for discussion given by teachers. a				.568							
20. Teachers' contemptuous attitude towards students a				.500							

Appendix A (continued)

	CFA factor loadings										
Items	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
Trust											
21. Safe course climate.					.754						
22. Experience of being welcome in the course.					.734						
23. Experience of being able to trust teachers.					.686						
24. Approachability of the teachers.					.668						
25. Possibility to be oneself in the course.					.610						
26. Experience of teachers' interest in students' viewpoints					.606						
27. Encouraging students to participate in discussions.					.571						
Participation activity											
28. Taking responsibility by being an active participant.						.866					
29. Asking questions and making comments in the course.						.842					
30. Expressing opinions in the course.						.796					
31. Willingness to participate even when having other things to do.						.709					
32. Enjoyment in taking initiatives and collaborating in the course.						.568					
Ease of participation											
33. Ease of participation in discussions.							.794				
34. Difficulties participating in discussions. [a]							.781				
35. Possibility to express thoughts and views without being ridiculed.							.730				
36. Courage to challenge matters presented in the course.							.502				
Opportunities to influence											
39. Student viewpoints were listened to.								.699			
38. Student viewpoints and opinions were taken into account.								.673			
39. Experience of having to perform according to external instructions. [a]								.571			
40. No opportunities to influence the goals set for this course. [a]								.407			
41. Sense of having possibilities to influence the working methods.								.410			
42. Opportunity to influence how competence is assessed in the course.								.386			
43. No possibilities to influence the contents in the course. [a]								.366			

Appendix A (continued)

	CFA factor loadings										
Items	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11
Opportunities to make choices											
44. No possibility to choose the contents supporting the learning goals. [a]									.755		
45. Sense of having opportunity to choose course contents that interested.									.676		
46. No possibility to choose between ways of completing the course. [a]									.522		
Interest and utility value											
47. The course was not inspiring. [a]										.862	
48. The course was not inspiring because of unclear utility value. [a]										.837	
49. High motivation to study in the course.										.798	
50. The contents of the course were interesting.										.670	
51. Desire to learn in order to understand.										.604	
52. Desire to succeed in the course.										.530	
53. Maintaining persistence in the face of the high effort demanded.										.362	
Peer support											
54. Experiencing other students as resources for learning.											.675
55. Asking for help from other students when needed.											.559
56. Providing support for other students in challenging study tasks.											.549
57. No possibilities to put competence at the disposal of the group.											.505
58. Opportunities to share competences in the group											.417

Note. [a] Reversed-coded item.

Appendix B

Correlations between factors of the AUS Scale.

Factors	1 (CB)	2 (SE)	3 (EQ)	4 (TS)	5 (TR)	6 (PA)	7 (EP)	8 (OI)	9 (OC)	10 (IU)	11 (PS)
1. Competence beliefs (CB)	-					.					
2. Self-efficacy (SE)	.83***	-									
3. Equal treatment (EQ)	.45***	.46***	-								
4. Teacher support (TS)	.46***	.42***	.89***	-							
5. Trust (TR)	.51***	.49***	.88***	.92***	-		.				
6. Participation activity (PA)	.24***	.34***	.35***	.38***	.54***	-					
7.Ease of participation (EP)	.44***	.45***	.68***	.57***	.78***	.77***	-				
8. Opportunities to influence (OI)	.22***	.27***	.53***	.57***	.69***	.81***	.76***	-			
9. Opportunities to make choices (OC)	.33***	.31***	.43***	.50***	.47***	.35***	.34***	.66***	-		
10. Interest and motivation (IM)	.34***	.37***	.37**	.46***	.58***	.70***	.51***	.69***	.51***	-	
11. Peer support (PS)	.22***	.37***	.63***	.63***	.79***	.65***	.70***	.75***	.60***	.55***	-

Note. ***$p < .001$

Appendix C

Standardised factor loadings based on the final second-order confirmatory factor analysis (CFA) for the AUS Scale.

	CFA factor loadings		
Factors in the order of latent domains and their loadings	F1	F2	F3
Personal resources			
1. Competence beliefs	.909		
2. Self-efficacy	.909		
Relational resources			
3. Trust		.981	
4. Teacher support		.930	
5. Equal treatment		.906	
Participatory resources			
6. Opportunities to influence			.921
7. Ease of participation			.845
8. Peer support			.838
9. Participation activity			.833
10. Interest and utility value			.722
11. Opportunities to make choices			.588

Appendix D

Correlations between second-order factors of the AUS Scale.

Second-order factors	1 (PeR)	2 (RR)	3 (PaR)
1. Personal resources (PeR)	-		
2. Relational resources (RR)	.75***	-	
3. Participatory resources (PaR)	.44***	.55***	-

Note. ***$p < .001$

Appendix E

Factor loadings based on the EFA's one-factor solution for the SCLA Scale.

	Factor loadings
Abbreviated items in the order of factors and their loadings	F1
1. Feedback on learning from the teacher	.762
2. Personalised learning tasks	.728
3. Time/space for dialogue	.665
4. Problem solving tasks	.660
5. Self-assessment of one's own learning	.642
6. Working with other students	.640
7. Documenting the task performance for assessing one's learning process	.573
8. Inquiry based learning and open questions	.538
9. Tasks for defining one's own learning needs and aims of learning	.493
10. Critical assessment of knowledge	.460

Note. For better readability, factor loadings less than .32 are not listed.