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ORIGINAL PAPER

Student-centred learning environments: an investigation into student teachers' instructional preferences and approaches to learning

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Abstract The use of student-centred learning environments in education has increased. This study investigated student teachers' instructional preferences for these learning environments and how these preferences are related to their approaches to learning. Participants were professional Bachelor students in teacher education. Instructional preferences and approaches to learning were measured by means of questionnaires. Results showed that most students preferred teacher direction, cooperative learning and knowledge construction, and adopted a deep approach. Moreover, significant correlations were found between approaches to learning and instructional preferences. Students adopting a deep approach preferred knowledge construction and cooperative learning, while students adopting a surface approach had a preference for teacher direction and passive learning.

Keywords Approaches to learning · Instructional preferences · Student-centred learning environment · Student teachers

Introduction

Over recent decades, the educational landscape has changed drastically. Teacher-centred learning environments, in which the teacher is considered to be the primary source of information while the student is regarded as the receiver of that information (Loyens and Rikers 2011), have faded into the background, while student-centred learning environments, inspired by the constructivist view on learning, have emerged. In student-centred

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learning environments, students are expected to show greater activity and responsibility for their learning (Cannon and Newble 2000). There are many benefits expected from student-centred learning environments, such as establishing deep learning and understanding within students (Lea et al. 2003; Vermetten et al. 2002). But how do students, and in particular student teachers who will have to implement these innovative learning environments in the future, judge them? Do they appreciate them or do they hold onto conventional teacher-centred approaches? And do their approaches to learning suit the demands of a student-centred learning environment? In the present study, student teachers' instructional preferences and their approaches to learning were examined.

Student-centred learning environments

The interest in student-centred learning environments is not new. There have always been methods that try to involve students in their own education. For example, the ancient philosopher Socrates already highlighted the role of the student when using the method of dialogue, in which the teacher helps the student to solve a problem by asking questions (Loyens and Rikers 2011). During recent decades, however, the interest in the development of student-centred learning environments has increased because of the influence of constructivist learning theory (Hannafin et al. 1997), which defines learning as an "active process in which learners are active sense makers who seek to build coherent and organised knowledge" (Mayer 2004, p. 14). Although some researchers indicate that active knowledge construction can take place in different learning environments, even while attending a lecture (Renkl 2009), others argue that particular constructivist learning environments should be developed in order to enhance active knowledge construction (Loyens and Rikers 2011). In the literature, several terms have been used to refer to these constructivist learning environments, such as: student-centred (Loyens and Rikers 2011), discovery-based (Alfieri et al. 2011), inquiry-based (Loyens and Rikers 2011) and student-activating (Struyven et al. 2010). Although different labels have been used, they all share some core design principles, which we have grouped into five categories: (1) stimulating knowledge construction, (2) considering the teacher as a facilitator and coach of the learning process, (3) implementing cooperative work, (4) using authentic assignments and (5) embedding opportunities for self-regulated learning.

Because students are expected to construct knowledge for themselves, the first design principle emphasises knowledge construction (Mayer 2004). Instead of simply the teacher providing the target information (Alfieri et al. 2011; Kirschner et al. 2006), students are required to select, interpret and apply new information (Struyven et al. 2010). In this way, it emphasises students' active participation in learning (Cannon and Newble 2000).

Together with the student's changing role towards becoming an active participant in learning, the teacher's role changes also. According to the second design principle, the teacher, rather than a provider of information (Beijaard et al. 2000), has to become a facilitator of learning (Beijaard et al. 2000; Huang 2002) and a coach (Dochy et al. 2002). The teacher has to stimulate students to question, challenge and form their own conclusions (Pratt 2008). Therefore, he or she poses open-ended questions and, when the students appear to become stuck, gives hints (Suebnukarn and Haddawy 2006) without explicitly giving the final answers to the students (Hmelo-Silver et al. 2007).

The third design principle refers to learning in cooperation with fellow students (Bostock 1998; Loyens et al. 2007b; Tynjälä 1999). Based on their prior knowledge and individual experiences, students can interpret the same things differently. Therefore, it is considered to be valuable for learning to take place in interactive and cooperative formats

(Tynjälä 1999), such as in heterogeneous and small student groups (Chung 1991). Through the students' social negotiations and interactions, different point of views can become apparent (Tynjälä 1999), which can help to clarify misconceptions, to identify ineffective solutions (Bostock 1998), and to communicate about the learning content because the level of different students' understanding is more similar than is the teacher's level (Loyens and Gijbels 2008).

The fourth design principle concerns the use of authentic assignments (Elen et al. 2007; Kirschner et al. 2006; Loyens et al. 2007b). Learning should take place in contexts reflecting the way in which knowledge would be useful in real life (Herrington and Oliver 2000). Consequently, the need arises for authentic assignments to simulate real-life situations (Tynjälä 1999; Vermetten et al. 2002) such as, for instance, practical cases or vocational problems (Struyven et al. 2006).

The fifth design principle refers to embedding, in the learning environment, opportunities for self-regulated learning. Being 'constructors' of their own knowledge, students are required to become self-regulated learners (De Corte 2000; Järvelä and Niemivirta 1999; Tynjälä 1999). This means that students have to manage and monitor their own processes of knowledge construction (De Corte 1996; Martens et al. 2007) and, as such, have to take responsibility for their own learning (Bostock 1998). They are expected to know about effective learning strategies (e.g. setting goals and making plans) and how and when to use them (Loyens et al. 2007b; Loyens and Rikers 2011). The learning environment has to support students' self-regulation by, for instance, letting students formulate their own learning goals or by providing opportunities for them to reflect on their performance (Cleary and Zimmerman 2004).

This list of design principles is neither exhaustive nor does it imply that all design principles should be present in order that a learning environment be labeled as 'constructivist' or 'student-centred'. Often, 'student-centred' is used as an umbrella term to indicate a wide variety of learning environments based commonly on constructivist learning theory. These are, for instance, problem-based learning, project-based learning, case-based learning and inquiry-based learning. These student-centred approaches are often presented as the opposite of teacher-centred approaches such as direct instruction and lectures, in which the teacher transmits information to students (Elen et al. 2007; Torenbeek et al. 2011).

Because students in student-centred learning environments are required to learn meaningfully by actively interpreting the selected information based on their prior knowledge, and by actively constructing new knowledge based on the interpreted information (Renkl 2009), it seems necessary that they adopt a deep approach to learning in order to reach congruence with the demands of the learning environment (Vermunt and Verloop 1999). Therefore, it is expected that student-centred learning environments encourage students to adopt a deep approach to learning (Lea et al. 2003; Struyven et al. 2006).

Approaches to learning

In general, a distinction can be made between two approaches to learning (i.e. the deep and the surface approaches) (Dinsmore and Alexander 2012). Students adopting a deep approach use deep learning processes (e.g. relating ideas, using evidence and seeking meaning in order to reach understanding). This deep approach to learning is in contrast to a surface approach in which students are characterised as having extrinsic motivation and a fear of failure; they use surface learning processes which are limited to rote memorisation and a narrow, syllabus-bound attitude (Biggs et al. 2001; Entwistle and McCune 2004).

Besides the deep and surface approaches, a third approach, called a strategic or achieving approach, has been distinguished (Entwistle and McCune 2004). Students with a strategic approach are stimulated by the need for achievement. These students are aware of the study requirements and try to accomplish them by using organised study methods (Entwistle and McCune 2004; Entwistle and Tait 1990).

In order to investigate the assumption that student-centred learning environments enhance the adoption of the deep approach to learning, a considerable number of studies has been conducted into the dynamics in approaches to learning in a student-centred learning environment (e.g. Baeten et al. 2012; Gijbels et al. 2008) or into comparisons of approaches to learning in different learning environments, including student-centred learning environments (e.g. Nijhuis et al. 2005; Struyven et al. 2006; Wilson and Fowler 2005). Nevertheless, these studies did not reveal unequivocal results. In 2010, an extensive literature review (Baeten et al. 2010) was conducted to explore explanations for the diverging results. One possible explanatory factor is students' instructional preferences. Students might not reach a deep approach to learning in a student-centred learning environment because they do not prefer this type of learning environment (Baeten et al. 2010). The way in which students perceive a learning environment influences their approach to learning and their learning outcomes more than the learning environment itself (Entwistle 1991; Parpala et al. 2010). Therefore, it can be hypothesised that students' preferences concerning the learning environment are related to their approaches to learning. Research into instructional preferences could help in understanding students' learning in student-centred learning environments.

Previous research on the relationship between approaches to learning and instructional preferences revealed positive relationships between the deep approach and a preference for teaching methods that support understanding, such as lecturers who encourage students to think for themselves and show that they themselves think (Byrne et al. 2004; Entwistle and Tait 1990; Papinczak 2009). Moreover, the deep approach was positively associated with a preference for teaching that facilitated learning, such as open questions in examinations and discussions in tutorials (Entwistle and Tait 1993). Finally, students with a deep approach preferred interactive teaching methods, such as laboratory classes, small-group tutorials and discussion groups (Chamorro-Premuzic et al. 2007). So, if students prefer teaching methods that are interactive (Chamorro-Premuzic et al. 2007), support understanding (e.g. Byrne et al. 2004) or facilitate learning (Entwistle and Tait 1993), a deep approach is more frequently adopted.

Instructional preferences

Measuring instructional preferences supports the customer view of students in higher education. Students are "increasingly being seen and seeing themselves as primary customers" of education (Lea et al. 2003, p. 323). On the other hand, while teachers are aware of their rights, they are considered to be service providers who have to take into account the expectations and needs of their customers, the students. This approach is called the 'outside in' approach, which has been successful in service industries. By moving towards an 'outside in' approach, an institution for higher education can cover student diversity, and affect student admission and retention, because students are inclined to follow a course that meets their needs (Lea et al. 2003). However, what students prefer might not be the best alternative for them. For instance, they might prefer teacher-centred learning environments if they are not willing to take an active role and only want to pass the courses with minimum effort (Beausaert et al. 2013; Trigwell et al. 1999). Therefore, it would be interesting to investigate the interrelationship between instructional preferences and approaches to learning.

Previous research on instructional preferences did not yield univocal results. While some studies showed students preferring teacher-centred styles/learning environments (Sadler-Smith and Riding 1999; Van Petegem et al. 2005), other studies showed preferences for student-centred styles/learning environments (Drew 2001; Wierstra et al. 2003). Other studies revealed that students prefer both instructional approaches (Chang and Chang 2010) or take a middle position between the two (Hativa and Birenbaum 2000). With regard to these ambiguous results, it is interesting to consider student preferences for separate student-centred features. To the best of our knowledge, this still remains a proactive research area to explore. With respect to conceptions of specific student-centred features, Loyens et al. (2007a) developed a questionnaire. However, conceptions refer to the way in which students understand the nature of learning. Because we were interested in capturing students' preferences for student-centred features, a new questionnaire was developed.

Investigating instructional preferences could be particularly interesting for student teachers, who could apply student-centred teaching methods in their future teaching practice. If student teachers are being taught by means of student-centred learning environments and recognise their importance and strengths, they might be encouraged to use them in their future teaching practice (Schelfhout et al. 2006).

Besides instructional preferences and approaches to learning, we take into account some student characteristics in order to investigate whether there are differences in instructional preferences and approaches to learning within the student population. Previous research shows interrelationships between gender and type of teacher education programme on the one hand and instructional preferences on the other hand (Van Petegem et al. 2005) and between age and approaches to learning (Baeten et al. 2010). Therefore, we included gender, type of teacher education programme, and year of education as student characteristics in the present study.

Research questions

The introduction above shows the importance of examining student teachers' instructional preferences in the changing educational landscape. Moreover, it indicates the value of investigating whether student teachers adopt deep approaches to learning, which are assumed to suit the demands of a student-centred learning environment. Furthermore, the interrelationship between both is considered important to study. If the approach to learning is related to specific instructional preferences, this could help to explain why a certain learning environment does not suit all learners. The research questions are threefold:

- Which instructional preferences and approaches to learning do student teachers have?
- Do the instructional preferences and approaches to learning of student teachers relate to student characteristics (gender, year of teacher education, and type of teacher education programme)?
- Are student teachers' instructional preferences and their approaches to learning related?

Method

Participants

The participants were 760 student teachers from ten different institutions for teacher education, spread over different regions in Flanders (Belgium). Student teachers were either first-year ($n = 443$; 58.3 %) or second-year ($n = 317$; 41.7 %) professional Bachelor students. In Flanders, there are three types of teacher education programmes in the professional Bachelor of Teacher Education: the pre-primary programme, which prepares students to become teachers in kindergarten; the primary programme, which prepares students to become teacher in primary education; and the lower-secondary programme, which prepares students to become teacher in lower-secondary education. Our sample contained students from all three programmes: 18.8 % of students were from the pre-primary programme ($n = 143$), 26.5 % of students were from the primary programme ($n = 201$) and 54.7 % of students were from the lower-secondary programme ($n = 415$). Student teachers in our sample were mainly female ($n = 562$; 73.9 %) and the percentage of female students decreased as the age of the target group increased: in the pre-primary programme, 96.5 % of students were female; in the primary programme, 82.1 % of the students were female; and, in the lower-secondary programme, 62.2 % of the students were female. Compared with the student population registered in teacher education in Flanders (Flemish Ministry of Education and Training 2010), our sample proved to be representative.[1] The distribution of the respondents is presented in Table 1. All student teachers participated voluntarily. Their participation was anonymous and only the researchers had access to the database.

Design

The research design was cross-sectional. Two cohorts of student teachers (first-year and second-year students) were included. Both questionnaires (instructional preferences and approaches to learning) were administrated at the same moment, either by means of a paper-and-pencil questionnaire (in class) or by means of a digital questionnaire (through email or learning platform). Both versions were identical. The digital version was used in order to increase the response rate because it was not possible for all schools ($n = 6$) to administer the questionnaire by means of paper-and-pencil questionnaires during regular class hours.

Instruments

Instructional preferences were measured through a newly-developed questionnaire. This questionnaire consisted of 77 items, scored on a five-point Likert scale, with response categories ranging from ‘to a large extent’ (5) to ‘not at all’ (1). These items were formulated in order to measure the features of student-centred learning environments (see Introduction). Because teacher-centred and student-centred learning environments can be placed on a continuum (Fung and Chow 2002), items measuring teacher-centred features were incorporated with the aim of reversing students’ answers to these items. An exploratory factor analysis, using the maximum likelihood method with varimax rotation, was conducted to identify the underlying data structure. The discriminant ($6.64 \times E^{-11}$), the Kaiser–Meyer–Olkin measure (0.88) and Bartlett’s test of sphericity [χ^2 $(2926.00) = 16955.18$, $p < 0.001$] verified that the data were adequate for conducting factor analysis. The number of factors was determined by the scree plot criterion. Only items that loaded significantly on a factor (≥ 0.40) were included. Significant cross-loading

[1] In comparison to the population, our sample contained slightly more female students (population = 70.23 %) and students taking the lower-secondary programme (population = 49.34 %), and less students taking the pre-primary (population = 20.56 %) and primary programme (population = 30.10 %).

Table 1 Distribution of the respondents

Teacher education programme	Pre-primary		Primary		Lower-secondary	
	Male	Female	Male	Female	Male	Female
First year	4	76	18	103	88	153
Second year	1	62	18	62	69	105

items were excluded if differences between the factor loadings were <0.20. Four factors (Table 2) were extracted with a proportion of explained variance of 33.55 %: factor 1 clustered 13 items concerning preferences for knowledge construction (9.19 % explained variance), factor 2 contained 11 items regarding preferences for teacher direction (9.02 % explained variance), factor 3 consisted of 10 items with preferences for cooperative learning (8.87 % explained variance), and factor 4 clustered six items regarding preferences for passive learning (6.48 % explained variance).

The four factors showed high reliability: scale Cronbach alpha coefficients were, respectively, 0.81, 0.80, 0.83 and 0.70. Items related to the same factor were averaged in order to represent the score on the underlying construct. Two factors measured features related to the student-centred pole of the continuum (i.e. knowledge construction and cooperative learning, which were significantly positively correlated (Table 3). The two other factors measured features on the teacher-centred pole (i.e. teacher direction and passive learning. Their positive correlation was of borderline significant ($p = 0.059$). Several significant associations were found between factors of both poles, namely, a negative association between a preference for knowledge construction on the one hand and a preference for teacher direction and passive learning on the other hand, and a positive association between a preference for teacher direction and a preference for cooperative learning.

Student approaches to learning were operationalised as the typical approach to learning that a student usually adopts. They were measured by means of the Approaches to Learning and Studying Inventory (ALSI) (Entwistle et al. 2002). The ALSI contains 36 items scored on a five-point Likert scale. The response-categories range from 'agree' (5) to 'disagree' (1). Five scales can be distinguished: deep approach (for example, "I usually set out to understand for myself the meaning of what we have to learn."), surface approach (for example, "Often I have to learn over and over things that don't really make much sense to me."), monitoring studying (for example, "When I've finished a piece of work, I check to see it really meets the requirements."), organised studying (for example, "I'm quite good at preparing for classes in advance.") and effort management (for example, "I generally keep working hard even when things aren't going all that well."). The scale 'monitoring studying' relates to the deep approach and describes metacognitive aspects of learning and studying. The scales 'organised studying' (including time management) and 'effort management' (including concentration) refer to the strategic approach. Confirmatory factor analysis using LISREL 8.7 confirmed the five scales as separate constructs. The standardised root mean square residual (SRMR), the root mean square error of approximation (RMSEA) and the comparative fit index (CFI) were, respectively, 0.07, 0.06 and 0.94, which indicated an adequate fit of the five-factor model (Hu and Bentler 1999). Cronbach alpha coefficients were high, namely, 0.79 for deep approach, 0.77 for surface approach, 0.74 for monitoring studying, 0.79 for organised studying and 0.79 for effort management. Items related to each scale were averaged in order to represent the score on the scale.

Table 2 Items and factor loadings based on the rotated factor matrix of the four-factor model

Factor	Factor loadings	Items
Knowledge construction		To what extent would you like that…
	0.545	… you are encouraged to search for relevant information about a subject yourself?
	0.542	… you are expected to integrate information from different sources when doing an assignment (class material, course book, internet, library books, previously studied subject matters, …)?
	0.535	… assignments are provided in which you have to look for an adequate solving strategy yourself?
	0.509	… you are expected to spend effort to solve assignments or problems with regard to the subject matters yourself?
	0.506	… you are expected to study parts of the course, which are not covered in class, by yourself?
	0.505	… you are expected to look for relationships between previously studied subject matters within the course and other information (such as actual events, subject matter from other courses, …)?
	0.486	… you are stimulated to search for alternative ideas or concepts when the teacher introduces new ideas or concepts?
	0.482	… the teacher encourages you to think for yourself?
	0.477	… you are expected to show a critical attitude?
	0.475	… the examination also assesses subject matters which were not covered during class time but which you had to process by yourself?
	0.473	… the assignments are partly based on self-teaching?
	0.467	… assignments are provided that challenge you?
	0.442	… you are expected to interpret new information based on previously studied subject matter?
Teacher direction	0.624	… it is described during the course how to best summarise the subject matter?
	0.597	… it is indicated how the subject matter is studied best (producing titles, summaries, tables, …)?
	0.588	… the teacher tells you what, according to him, is the best way to prepare for the examination?
	0.542	… the teacher teaches you learning strategies that contribute to understand the subject matter?
	0.535	… the teacher summarises the basic thoughts at the end of a theme or chapter?
	0.520	… all the subject matter is gone through in class by the teacher?
	0.520	… the teacher indicates the relationships between the subject matter and other things (such as subject matter from other courses, daily things, relevant literature, topical matters, …)?
	0.496	… the subject matter of the examination only comprises subject matter dealt with in class?
	0.475	… you are exactly being told what you have to write down in your notes?
	0.429	… you receive all the information you need to understand the subject matter?
	0.405	… it is stated during the course how the new subject matter relates to previously studied subject matter?

Table 2 continued

Factor	Factor loadings	Items
Cooperative learning	0.717	… you are encouraged to study in pairs or in group throughout the semester so that you can tell and explain the subject matter to each other?
	0.695	… peers help you when processing the subject matter?
	0.615	… the course is organised in a way that students can help each other?
	0.571	… peers explain to you the subject matter?
	0.570	… it is allowed to conduct assignments in pairs or in groups?
	0.548	… you are encouraged to study for the examination in pairs or in groups?
	0.538	… there are possibilities to share your own experiences with peers?
	0.476	… during the course the class is divided into groups to discuss, investigate or solve a problem?
	0.434	… group assignments are assigned, in which one final report has to be handed in by each group?
	0.418	… you can share ideas with peers?
Passive learning	0.614	… only one view on the topic is provided?
	0.589	… you are expected to adopt and accept the ideas that the teacher provides during the course?
	0.559	… the teacher prefers that you hold your personal opinion and considerations to yourself during the course?
	0.511	… you are expected to follow the teacher's view?
	0.444	… the teacher does not interact with the students during the course?
	0.420	… only examples that are described in the course book are provided?

Only loadings >0.40 are included

Table 3 Pearson product moment correlation coefficients between instructional preferences

Instructional preferences	Correlations			
	Knowledge construction	Teacher direction	Cooperative learning	Passive learning
Knowledge construction	1.00	−0.10**	0.20***	−0.11**
Teacher direction		1.00	0.29***	0.07
Cooperative learning			1.00	−0.03
Passive learning				1.00

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Results

Which instructional preferences and approaches to learning do student teachers have?

Descriptive statistics (Table 4) showed that teacher direction was the most preferred. Preferences for knowledge construction and cooperative learning followed. Passive learning was preferred the least.

Table 4 Descriptive statistics of instructional preferences and approaches to learning: overall, by gender (female, male), by type of teacher education (pre-primary, primary, lower-secondary), and by year of education (first-year, second-year)

Scale	M (*SD*)	M_{Female} (*SD*)	M_{Male} (*SD*)	M_{PP} (*SD*)	M_{P} (*SD*)	M_{LS} (*SD*)	$M_{First-year}$ (*SD*)	$M_{Second-year}$ (*SD*)
Knowledge construction	3.33 (0.54)	3.36 (0.54)	3.26 (0.55)	3.24 (0.50)	3.34 (0.52)	3.36 (0.57)	3.29 (0.53)	3.39 (0.55)
Teacher direction	3.87 (0.58)	3.90 (0.57)	3.78 (0.59)	3.96 (0.54)	3.98 (0.54)	3.78 (0.59)	3.92 (0.55)	3.79 (0.60)
Cooperative learning	3.52 (0.66)	3.52 (0.65)	3.53 (0.70)	3.66 (0.62)	3.56 (0.62)	3.45 (0.69)	3.53 (0.63)	3.51 (0.71)
Passive learning	2.08 (0.71)	2.05 (0.69)	2.15 (0.75)	2.30 (0.74)	2.01 (0.63)	2.0 (0.72)	2.09 (0.68)	2.05 (0.74)
Deep approach	3.83 (0.58)	3.87 (0.58)	3.73 (0.58)	3.84 (0.56)	3.81 (0.57)	3.84 (0.60)	3.83 (0.56)	3.83 (0.62)
Surface approach	2.70 (0.71)	2.70 (0.72)	2.69 (0.68)	2.87 (0.71)	2.75 (0.72)	2.61 (0.69)	2.75 (0.69)	2.62 (0.74)
Monitoring studying	3.81 (0.59)	3.89 (0.55)	3.58 (0.62)	3.87 (0.53)	3.85 (0.56)	3.76 (0.62)	3.82 (0.56)	3.79 (0.63)
Organised studying	3.34 (0.82)	3.46 (0.79)	3.00 (0.81)	3.44 (0.69)	3.36 (0.81)	3.29 (0.86)	3.35 (0.81	3.32 (0.84)
Effort management	3.68 (0.77)	3.85 (0.69)	3.21 (0.78)	3.92 (0.60)	3.74 (0.77)	3.58 (0.79)	3.70 (0.76)	3.66 (0.79)

With regard to approaches to learning, Table 4 shows that students scored highest on the deep approach and monitoring studying. They scored lower on effort management and organised studying, which both refer to the strategic approach. The surface approach was the least prevalent in our sample.

Do the instructional preferences and approaches to learning of student teachers relate to student characteristics (gender, year of teacher education and type of teacher education programme)?

By means of general linear models, the effects of the student characteristics of gender (male/female), year of teacher education (first/second) and type of teacher education programme (pre-primary education/primary education/lower-secondary education) were estimated. General linear models were conducted for all variables, except for preferences for cooperative learning and preferences for passive learning. For these dependent variables, the assumption of homogeneity of variances was not met in that Levene's test of equality of error variances proved to be significant ($F(11,\ 747) = 1.93$, $p < 0.05$ for cooperative learning and $F(11,\ 747) = 1.86$, $p < 0.05$ for passive learning).

Results of the general linear models in Tables 5 and 6 showed that female students put more effort into their study and concentrated better than male students. Concerning type of teacher education programme, a significant effect was found with respect to preferences for teacher direction and the surface approach to learning. Post hoc Bonferroni comparisons revealed that students in the pre-primary programme adopted more surface approaches to

Table 5 General linear models of instructional preferences

Scale	*F*	*df*	Partial η^2	Bonferroni comparisons ($p < 0.05$)
Knowledge construction				
Gender	0.09	1, 747	0.00	
Year of education	2.95	1, 747	0.00	
Teaching programme	0.09	2, 747	0.00	
Gender × Year of education	0.50	1, 747	0.00	
Gender × Teaching programme	1.94	2, 747	0.01	
Year of education × Teaching programme	2.16	2, 747	0.01	
Gender × Year of education × Teaching programme	0.09	2, 747	0.00	
Teacher direction				
Gender	0.64	1, 747	0.00	
Year of education	0.08	1, 747	0.00	
Teaching programme	7.32**	2, 747	0.02	PP, P > LS
Gender × Year of education	0.24	1, 747	0.00	
Gender × Teaching programme	1.02	2, 747	0.00	
Year of education × Teaching programme	0.88	2, 747	0.00	
Gender × Year of education × Teaching programme	0.21	2, 747	0.00	

** $p < 0.01$

learning and showed a higher preference for teacher direction than students in the lower-secondary programme. Students in the primary programme did not adopt more surface approaches to learning than students in the lower-secondary programme, but they did have a higher preference for teacher direction.

Besides main effects, interaction effects were estimated. With respect to monitoring studying, the interaction effect of year of teacher education and type of teacher education programme proved to be significant. Figure 1 shows that all first-year students (pre-primary, primary and lower-secondary programme) scored the same on monitoring studying. In the second-year, however, differences were found between the three teaching programmes, with students in the pre-primary programme scoring the highest, followed by students in the primary programme. Students in the lower-secondary programme scored the lowest on monitoring studying.

Regarding effort management, the interaction effect of gender and type of teacher education programme proved to be significant. Figure 2 shows that, especially for male students, differences were found between the teaching programmes. Male students in the pre-primary programme scored higher on effort management than male students in the primary and lower-secondary programme. In the pre-primary programme, the number of male students was very limited. Therefore, these male students, who want to become a kindergarten teacher, might be highly motivated and, consequently, put more effort into their study and concentrate better than the male students in the other two programmes.

In conclusion, the general linear models revealed some significant relations between student characteristics and instructional preferences/approaches to learning. However, effect sizes were small and ranged between 0.01 and 0.02.

Table 6 General linear models of approaches to learning

Scale	F	df	Partial η^2	Post hoc Bonferroni comparisons ($p < 0.05$)
Deep approach				
Gender	0.02	1, 716	0.00	
Year of education	0.46	1, 716	0.00	
Teaching program	0.49	2, 716	0.00	
Gender × Year of education	0.18	1, 716	0.00	
Gender × Teaching program	1.01	2, 716	0.00	
Year of education × Teaching program	2.67	2, 716	0.01	
Gender × Year of education × Teaching program	0.35	2, 716	0.00	
Surface approach				
Gender	2.04	1, 716	0.00	
Year of education	0.01	1, 716	0.00	
Teaching program	3.76*	2, 716	0.01	PP > LS
Gender × Year of education	1.02	1, 716	0.00	
Gender × Teaching program	0.78	2, 716	0.00	
Year of education × Teaching program	1.96	2, 716	0.01	
Gender × Year of education × Teaching program	0.97	2, 716	0.00	
Monitoring studying				
Gender	0.81	1, 716	0.00	
Year of education	3.14	1, 716	0.00	
Teaching program	1.84	2, 716	0.01	
Gender × Year of education	3.43	1, 716	0.01	
Gender × Teaching program	1.64	2, 716	0.01	
Year of education × Teaching program	3.12*	2, 716	0.01	
Gender × Year of education × Teaching program	1.71	2, 716	0.01	
Organised studying				
Gender	3.16	1, 716	0.00	
Year of education	2.08	1, 716	0.00	
Teaching program	1.09	2, 716	0.00	
Gender × Year of education	1.70	1, 716	0.00	
Gender × Teaching program	1.60	2, 716	0.00	
Year of education × Teaching program	1.99	2, 716	0.01	
Gender × Year of education × Teaching program	1.49	2, 716	0.00	
Effort management				
Gender	8.35*	1, 716	0.01	
Year of education	1.33	1, 716	0.00	
Teaching program	2.66	2, 716	0.01	
Gender × Year of education	2.01	1, 716	0.00	
Gender × Teaching program	3.62*	2, 716	0.01	
Year of education × Teaching program	1.26	2, 716	0.00	
Gender × Year of education × Teaching program	2.45	2, 716	0.01	

* $p < 0.05$

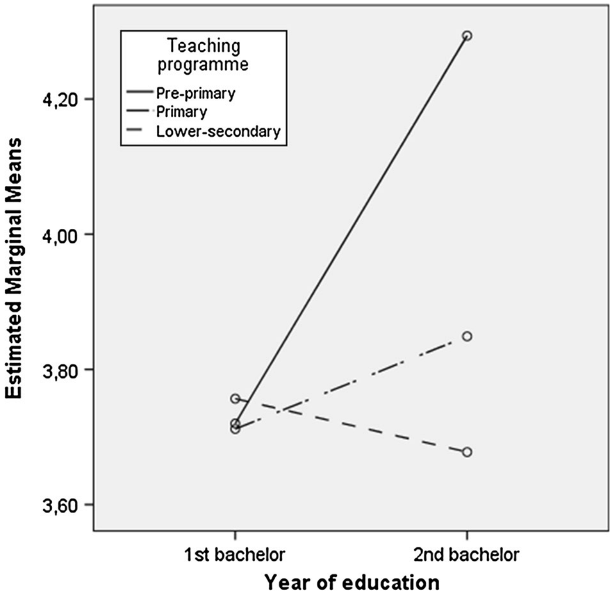

Fig. 1 Significant interaction effect of year of education with teaching programme on monitoring studying

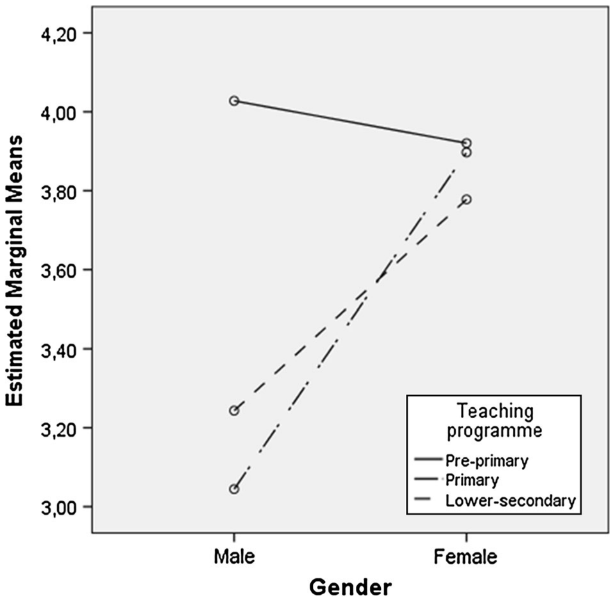

Fig. 2 Significant interaction effect of gender with teaching programme on effort management

Are students' instructional preferences and their approaches to learning related?

Correlational analyses (Table 7) showed significant associations between instructional preferences and approaches to learning. Students adopting a deep approach had a

Table 7 Pearson product moment correlation coefficients between instructional preferences and approaches to learning

Instructional preferences	Correlation with approaches to learning				
	Deep	Surface	Monitoring	Organised	Effort
Knowledge construction	0.50***	−0.31***	0.42***	0.20***	0.17***
Teacher direction	0.03	0.33***	0.10**	0.06	0.10**
Cooperative learning	0.09*	0.06	0.09*	−0.03	−0.01
Passive learning	−0.16***	0.41***	−0.04	0.19***	0.10**

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

preference for knowledge construction and cooperative learning, but not for passive learning. With regard to students adopting a surface approach, reverse relationships were found. These students had a preference for passive learning, but not for knowledge construction. Moreover, they preferred teacher direction. Students who scored high on monitoring studying had preferences for all scales, except passive learning. Students adopting a strategic approach (organised studying and effort management) had a preference for both knowledge construction and passive learning, which seems to be contradictory. Moreover, effort management was found to be related to a preference for teacher direction.

Conclusions and discussion

Instructional preferences

The purpose of the present study was to understand student teachers' instructional preferences and their approaches to learning. Results show that student teachers had the highest preference for teacher direction. While many attempts have been made in higher education to implement student-centred learning environments, in which the role of the teacher is minimised, student teachers themselves still preferred teacher direction (e.g. a teacher summarising the basic thoughts at the end of a theme or chapter or teaches learning strategies that contribute to understand the subject matter (Table 1). Therefore, a sufficient amount of teacher direction seems necessary in an era characterised by the development and implementation of student-centred learning environments. Teacher direction can offer structure, guidance and support. The fact that students are in favour of teacher direction corroborates the conclusion of Drew (2001) that students prefer an adequate level of support in student-centred learning environments. Similarly, Lea et al. (2003) indicated that students were concerned about their teachers' over-reliance on student-centred approaches at the expense of structure, guidance and support. It is not surprising that students preferred teacher direction, because this is what most of them are used to.

Teacher direction is not only preferred by students but it is also found to be effective for student learning. In this respect, the review study of Kirschner et al. (2006) showed that guided instruction was more effective than unguided or minimally-guided instruction. Kirschner et al. (2006) suggested that students, and in particular novice students such as first-year student teachers, should be provided with direct instructional guidance because they do not have a lot of knowledge in their long-term memory and lack appropriate schemata to integrate new information with prior knowledge. When their knowledge increases, this can take over from teacher guidance (Kirschner et al. 2006). Nevertheless, our study showed that teacher direction is still the most preferred in the second year, which shows the importance of teacher direction throughout both the first and second year.

Passive learning was not preferred by student teachers. In general, students did not like to follow the teacher's view and to adopt his or her ideas. This result supports the constructivist view of students as active participants in education (De Corte 2000; Mayer 2004). Student preferences for cooperative and knowledge construction, which are categorised as student-centred features, lie above the average value of three on a five-point Likert-scale. Therefore, we can conclude that students prefer not only the teacher-centred features of teacher direction, but also the student-centred features of cooperative learning and knowledge construction. This finding is in line with Chang and Chang (2010), who found that students prefer a learning environment which is both teacher- and student-centred. Elen et al. (2007) also found that, according to students, teacher-centred and student-centred features are not in conflict with each other. Instead, a combination seems desirable because one teaching method might not work for all types of students. Lectures, for instance, are considered to be beneficial for students who learn by listening (Bonwell 1996), while case-based learning is particularly suited for self-regulated learners (Ertmer et al. 1996). Therefore, a combination of teacher-centred and student-centred features seems to suit a broader student audience. In the ongoing debate about 'instruction' or 'construction' (Tobias and Duffy 2009), our results suggest that their complementary nature serves student teachers' preferences best. In many student-centered learning environments (except unguided discovery learning), teacher direction is already incorporated, for instance, the seven-jump method, the presence of a tutor, and other scaffolds in problem-based learning to structure the process.

Approaches to learning

Because students in student-centred learning environments have to select, interpret and apply information and, therefore, have to make sense of information themselves (Renkl 2009), they seem to be required to adopt a deep approach to learning, through which they look for relationships in learning content and searching for meaning (Biggs et al. 2001; Entwistle and McCune 2004). Results of our study show that student teachers' approaches to learning suit the demands of a student-centred learning environment because they adopt a deep approach, and score lowest on the surface approach. This might be explained by the discipline, because previous research shows that human sciences students, in general, adopt a deep approach to learning (Baeten et al. 2010). Besides a deep approach, students in our sample also score highly on monitoring studying. Both the deep approach and monitoring studying have been found to be interrelated in the past (Entwistle et al. 2002).

Student characteristics

The relationship between instructional preferences, approaches to learning and student characteristics is limited. So, student characteristics only play a minor role. Although numerous studies did not find any significant relationship between gender and approach to learning (Baeten et al. 2010), the present study revealed one significant difference (i.e. female students expending more effort and concentrating than male students). This result is in line with the study of Smith and Miller (2005) who found that female students scored higher on the achieving (or strategic) strategy than male students. Nevertheless, the effect size in our study was small. With regard to instructional preferences, no significant gender differences were found.

Concerning type of teacher education programme, two significant main effects were found, but they were associated with small effect sizes. Students in the pre-primary programme adopted more surface approaches to learning and had a stronger preference for teacher direction than students in the lower-secondary programme. Students in the primary programme also scored higher than students in the lower-secondary programme on preferences for teacher direction. Because a surface approach is characterised by memorising without understanding, unreflective studying, defragmented knowledge and unthinking acceptance (Entwistle et al. 2002), it is understandable that pre-primary student teachers prefer teacher direction during the course (e.g. a teacher who summarises, gives you all the information, indicates relationships and whose examinations only comprises subject matter dealt with in class). Moreover, correlational analyses indeed showed a significant association between the surface approach and preferences for teacher direction.

Differences between the teacher education programmes might be explained by differences in student population. While the student population in the pre-primary programme was relatively heterogeneous with students from the technical track (the majority), the vocational track (±25 % of students), the general track (±20 % of students) and the arts track (a minority) in high school, the student population in the primary and lower-secondary programme is more homogeneous with about half of the students from the technical track, about half of the students from the general track, and a minority of the students from the vocational and arts track (Flemish Ministry of Education and Training 2009). It might be that students from the vocational and technical track remain at a surface level of studying and need more teacher direction, as compared with students from the general track.

The interrelationship of approaches to learning and instructional preferences

Concerning the interrelationship of student approaches to learning and instructional preferences, we can conclude that students adopting a deep approach preferred knowledge construction and cooperative learning, but did not like passive learning. Students with a surface approach, on the other hand, had a preference for passive learning and teacher direction, and disliked knowledge construction. These findings show that students with a deep approach, who had the intention to understand, relate ideas and use evidence (Entwistle et al. 2002), recognised and appreciated the learning potential of constructivist teaching practices more than students with a surface approach (Campbell et al. 1996). Another interesting finding was that strategic learners had a preference for knowledge construction, which assumes that students actively look up and interpret information, but also for passive learning. Their preferences for both features might be explained by the fact that strategic learners are motivated by a need for achievement and, consequently, need to know the requirements for getting high marks (Entwistle and McCune 2004). So, they might prefer either knowledge construction or passive learning, depending in terms of what they expect in terms of the assessment.

Limitations

Despite the obvious value of the present study for understanding student teachers' instructional preferences and approaches to learning, some limitations are recognised. First, the study was limited to cross-sectional data collection and, consequently, the differences in instructional preferences and approaches to learning between first- and second-year student teachers could be attributable to the use of two different cohorts, or to the fact that selection had taken place when progressing from the first to the second year, with only successful students reaching the second year. Therefore, a longitudinal study, in which the same student cohort was followed through the whole teacher education programme, would complement our results. Secondly, our study was limited to first- and second-year students. However, in Flanders, the teacher education programme consists of 3 years. So, including third-year student teachers in future research would seem valuable. Thirdly, although our aim was to understand students' preferences for student-centred features, the feature 'authentic tasks' did not come to the fore in the questionnaire. Subsequent research into the formulation of items related to authentic tasks seems to be necessary before adding new items about 'authentic tasks' to the questionnaire. Fourthly, context characteristics for the class and school were not incorporated. Our aim was to study general instructional preferences and approaches to learning of student teachers. However, it would be interesting to look into the teaching methods used in the different classes and schools in order to explain students' instructional preferences and approaches to learning. Fifthly, our study only made use of self-report measures. Although self-report measures are of significant value in education, these measures should be complemented with direct measures which involve observing students' learning during student-centred learning activities. Finally, the way in which students approach their learning is strongly influenced by the way in which they are assessed. However, we did not take into account the actual assessment practices in the teacher education institutions or students' perceptions about these assessment practices.

Notwithstanding these limitations, the present study sheds light on first- and second-year student teachers' approaches to learning and their instructional preferences by measuring several student-centred and teacher-centred features directly. The study shows that student teachers adopt a desirable deep approach and prefer teacher direction, cooperative learning and knowledge construction. Although there are many pleas for the use of student-centred learning environments, our results suggest that it is important to build in sufficient teacher direction in these learning environments. Student teachers prefer teacher direction and effect studies show benefits of incorporating lectures in student-centred learning environments (e.g. Mayo 2002, 2004; Sivan et al. 2000). Nevertheless, students also have a preference for knowledge construction and cooperative learning, which shows that they are willing to embrace student-centred learning environments. The question is not 'or' but 'how to combine' different instructional settings.

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