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# Does a New Learning Environment Come Up to Students' Expectations? A Longitudinal Study

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School transitions and educational innovations confront students with changes in their learning environment. Though expectations are known to influence perceptions and motivation, which, in turn, influence the effectiveness of any situation, students' expectations for a new learning environment have received little attention. This longitudinal survey, conducted with 1,335 high school students (average age, 15 years), studied students' expectations and subsequent perceptions of 5 characteristics of a new environment (fascinating content, productive learning, student autonomy, interaction, and clarity of goals) and the students' (prospective) dissatisfaction. Results showed that expectations were positively related to later perceptions. Also, high prospective dissatisfaction was related to higher actual dissatisfaction with the environment later on. Investigating expectations and prospective dissatisfaction in relation to student characteristics (i.e., motivational orientations; conceptions of learning; strategies for regulation, information processing, and affective processing) show that motivational problems and fear of failure were risk factors for educational innovations. Furthermore, students' disappointment with the new environment was related to undesirable changes in student characteristics, such as increased fear of failure. The findings stress the importance of preparing students for curricular changes.

*Keywords:* student expectations, student perceptions, educational innovation, disappointment



Students' learning environments change several times during their school career: After kindergarten, they enter primary school, followed by secondary school and, possibly, higher professional education or university. Besides this school change, students are often confronted with educational innovations in school curricula, which cause changes in school practices. Before entering a learning environment, students form expectations and build ideas about how it will be, and these expectations are known to influence subsequent perceptions (e.g., Olson, Roese, & Zanna, 1996). This is highly relevant for education, because it has been shown that students' perceptions of a learning environment are of central importance for its effects on learning (Entwistle, 1991; Entwistle & Tait, 1990). However, the role of expectations in this context has received little attention, and that is a serious omission. Students' development and their pleasure in school are likely to be disturbed when their expectations of a learning environment do not match with their later perceptions.

The current study focused on students' expectations of a new learning environment and the longitudinal effects on their subsequent perceptions of this environment. Students' satisfaction or dissatisfaction with the expected and perceived environment was also examined. Additionally, relations between students' expectations and prospective dissatisfaction and their learning-related characteristics were explored, as well as relations between the degree of the mismatch of expectations and later perceptions, and the development of these student characteristics.

The literature on expectations in educational contexts is broad and concerns many aspects, which, however, do not specifically deal with the expectations of a learning environment. Examples include teachers' expectations of student performances (Weinstein, 1998); students' expectations of their own performances (i.e., self-efficacy, Bandura, 1977; Lopez, Lent, Brown, & Gore, 1997); students' expectations about connections between effort and performance in relation to a positive or negative mood state (Erez & Isen, 2002); students' expectations of success in relation to task-avoidance behavior, low achievement, and dissatisfaction (Nurmi, Aunola, Salmela-Aro, & Lindroos, 2003); and students' expectations of the utility of what they are learning for their future in relation to their learning motivation (future-time perspective theory; Kauffman & Hasman, 2004). In each of these studies, clear relationships have been found between expectations and the other variables being studied.

Thus, very little research has been conducted on students' expectations with regard to characteristics of a forthcoming course or learning environment. Twenty years ago, Rosinski and Hill (1986) pointed out the importance of investigating students' expectations of the content of a course and the degree to which the course met these expectations because expectations determine the way in which students enter a course or learning environment. It has also been found that students' expectations of the course objectives

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influence their perceptions of the course, even independent of what they actually encounter (Kirschner, Meester, Middelbeek, & Hermans, 1993). In spite of these results, research on students' expectations of a learning environment has lain fallow. More general psychological literature about expectations, however, indicates two reasons for taking the role of expectations in education more seriously: (a) Expectations affect the subsequent perception of a learning environment and so determine its effectiveness, and (b) expectations affect students' motivation, engagement, and investment of effort in learning.

## Expectations and Perceptions

The influence of expectations on students' perceptions of a learning environment is highly relevant because perceptions determine students' study behavior and, consequently, their performance and the effectiveness of the environment (Entwistle, 1991). Expectations can bias perceptions in three different ways. First, expectations bias information-gathering processes because they direct the learner's attention to information that is either consistent or clearly inconsistent with the expectations themselves. Both consistent and inconsistent information is more likely to be noticed, which leads to selective perception (Olson et al., 1996).

Second, expectations bias the interpretation of information because information is likely to be interpreted in a way that is consistent rather than inconsistent with expectations (Olson et al., 1996). A study on expectations of students' capabilities (Murray, 1996) has shown that ambiguous, stereotyped information about race, class, and gender affects the perceiver's estimates of the student's performances. Another example of the expectancy confirmation bias is found in diagnosing learning disabilities (Gnys, Willis, & Faust, 1995). Diagnostic decisions of school psychologists were found to be partly based on irrelevant information and false beliefs. Expectations heightened attention for illusory congruent characteristics in students' test scores and guided the interpretations and diagnoses.

Third, expectations bias subsequent behavior. People are likely to behave in a manner that is consistent with their expectations (Olson et al., 1996). A well-documented example of this phenomenon is learned helplessness (Seligman & Mayer, 1967)—the relinquishing of proactive behaviors when experiencing lack of control over the environment. Symptoms of learned helplessness have also been shown in educational contexts in which students gave up trying to perform when they did not see themselves as capable of reaching success (Craske, 1988). In addition to this direct effect on behavior, expectations may even shape the environment. People tend to behave in such a way that their behavior optimally matches their expectations, and thus, they create what they expect, a phenomenon known as a self-fulfilling prophecy (Merton, 1948). Research has shown that teachers, told that a class was highly intelligent, consequently expected higher performances, which subsequently resulted in higher student performances (the "Pygmalion in the classroom" experiment, Rosenthal & Jacobson, 1968).

Applied to education, adequate or inadequate expectations may have far-reaching effects. A student entering a learning environment with high expectations of finding certain characteristics there (e.g., student autonomy) will look for information consistent with the expectations, interpret this information in such a way that it supports the expectations, and behave in a way that is consistent with these expectations. This student is likely to have more positive perceptions than another student entering the same environment with low expectations of autonomy because that student will mainly attend to stimuli supporting the low expectations and will interpret stimuli and behave in a way consistent with low expectations. The student with low expectations for student autonomy, consequently, will display less autonomic behavior and a more passive attitude. In contrast, the student with higher expectations is more likely to find stimuli for autonomous behavior and will tend to be more proactive. In short, students in the same learning environment are likely to perceive it differently and to behave differently, depending on their a priori expectations of it.

Our study focused on the effects of students' expectations of a new learning environment on their later perceptions by addressing the following research questions: (a) Do expectations of a learning environment predict how the future environment is perceived? and (b) Is students' prospective dissatisfaction associated with the extent of actual dissatisfaction they experience in a learning environment?

## Expectations, Motivation, and Learning

Investigating students' expectations is not only relevant because expectations are related to perceptions but also because research reveals that expectations affect engagement, motivation, and investment of effort. According to the expectancy-value model (Eccles & Wigfield, 2002; Wigfield & Eccles, 2000), expectations and confidence or doubt about the attainability of the personal values influence different aspects of behavior, such as effort, persistence, and performance. These findings imply that students expecting a learning environment that corresponds with their desired environment—which means low prospective dissatisfaction—feel relatively confident and positive, which results in higher learning motivation in the future environment (see also Carver & Scheier, 2001). In contrast, students expecting a learning environment that is very different from their desired environment experience doubt and are in a negative mood, which results in low motivation and disengagement. This finding is in line with cognitive dissonance theory (Festinger, 1957), which states that inconsistencies between cognitions, feelings, and behaviors evoke a negative internal state that people try to reduce whenever possible. Cognitive dissonance is a fundamentally motivational state (Elliot & Devine, 1994), and thus, it is likely that dissonances that students experience in education will have negative motivational effects.

Consequently, a relation between expectations of a learning environment and motivation can be anticipated. More specifically, literature indicates that expectations of at least some characteristics of a learning environment can be hypothesized to be related to motivation. Contextualized and meaningful subject matter results in gains in motivation and involvement when compared with outcomes for abstract and decontextualized learning content (Cordova & Lepper, 1996). Recognizing the utility of course content leads to higher intrinsic motivation and better study habits (Simons, Dewitte, & Lens, 2004). Also, learning goals serving a directive function lead to greater investment of effort, positively affect persistence, and motivate the learner (Locke & Latham, 2002).

Besides the relation of the learning environment to motivation, students' *perceptions* of a learning environment have also been shown to be related to several other learning-related student characteristics (e.g., Luyten, Lowyck, & Tuerinckx, 2001; Wierstra & Beerends, 1996), especially to conceptions of learning (Tsai, 2000) and affective processing strategies (Könings, Brand-Gruwel, & van Merriënboer, 2005a). Motivation is only one aspect of a broader range of student characteristics that might be related to expectations. Vermunt (1996; Vermunt & Vermetten, 2004) defined five clusters of components of student learning: motivational orientations, conceptions of learning, affective processing strategies, information processing strategies, and regulation strategies. The current study explored how students' expectations relate to all components of these five clusters of learning-related characteristics. As perceptions have been shown to be related to more student characteristics than motivation alone, the same may also be true for expectations. No earlier research has focused on this aspect. Therefore, in addition to the two research questions defined earlier in Expectations and Perceptions, we investigated the following second set of research questions: (c) Are students' expectations of a learning environment associated with their motivational orientation and other student characteristics? and (d) Is students' prospective dissatisfaction associated with motivational orientation and other student characteristics?

## Expectations, Perceptions, and the Development of Student Characteristics

In addition to the relation between expectations and student characteristics, it is important to investigate the relation between possible differences in expectations and later perceptions (i.e., meeting expectations vs. disappointment with the environment) and the development of student characteristics. Carver and Scheier (2001) predicted strong declines in engagement in cases in which disappointment is encountered. For individuals who begin with high positivism and high engagement and who then experience situations that temper this positivism, engagement slowly decreases for a while. But at some point, a small decrease in the level of positivism produces an abrupt drop in the level of engagement.

So there are indications that the degree to which students' expectations are met influences the development of their learning-related student characteristics, like engagement or motivation. Therefore, the third set of research question is as follows: (e) Is the perceived learning environment in line with students' expectations? and (f) What is the relation between the mismatch in students' expectations and later perceptions and the developments in their learning-related characteristics?

## Powerful Learning Environments

This study investigated student expectations, perceptions, and learning-related characteristics in the context of powerful learning environments (PLEs). Such learning environments promote acquiring high-quality knowledge, problem-solving skills, self-directed learning skills, and transferability of knowledge and skills (see De Corte, Verschaffel, Entwistle, & van Merriënboer, 2003, and Könings, Brand-Gruwel, & van Merriënboer, 2005b, for an overview). Expectations with respect to five characteristics, described in the literature as fundamental to PLEs, were studied in more detail. First, PLEs should contain complex, realistic, and challenging learning tasks (van Merriënboer & Paas, 2003). Second, learning in a PLE is not directed toward reproduction of knowledge but toward an active process of making sense of the subject matter and creating mental models, which can be reused in new problem situations (Collis & Winnips, 2002; Moreno & Mayer, 1999). Third, a self-directed and independent way of learning and thinking is stimulated by gradually transferring the responsibility for the learning processes from the instructional agent to the students themselves (Vermunt, 2003). Fourth, through the inclusion of small groups, collaborative work, and ample opportunities for interaction, PLEs give students an active and constructive role in the learning process (van Merriënboer & Paas, 2003). Fifth, learning goals and task demands are clear as they direct learning strategies (Broekkamp, van Hout-Wolters, Rijlaarsdam, & van den Bergh, 2002).

The proposed concepts involved in the current study are depicted in Figure 1. At the first assessment time (T1), students' expectations of a new learning environment and their prospective

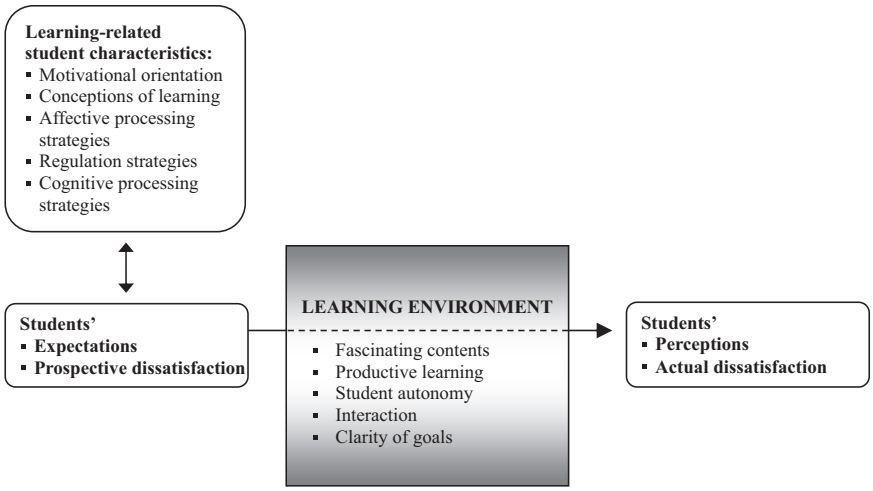


*Figure 1.* Visualization of the variables involved in the study.

dissatisfaction with it were measured on five characteristics of the environment. Additionally, their learning-related characteristics, like motivation, were investigated. Students reported on their perceptions and actual dissatisfaction with the learning environment after 1 year of experience (T2) and again after 2 years (T3). Relations among measures at T1, T2, and T3 were investigated as well as relations between expectations and student characteristics at T1. Finally, possible discrepancy between expectations at T1 and perceptions at T2 (i.e., disappointment) and the development of learning-related student characteristics was examined.

## Method

### Participants

At the first measurement (T1), the sample consisted of 842 students in the 9th grade (mean age = 15.27 years, *SD* = 0.52) from five secondary schools in the Netherlands who were attending either senior general education (i.e., a 5-year program, preparing for higher professional education) or preuniversity education (i.e., a 6-year program, preparing for university education) classes. They were on the eve of participating in an innovative PLE in Dutch secondary education called the Second Phase. One year later (T2), the sample consisted of 1,146 student in the 10th grade, 727 of whom already had participated at T1. At T2, all students had participated in the innovative environment for 1 year. At T3, the sample consisted of 704 students in the 11th grade from four schools: 433 students participated at all three measurement moments; 181 at T2 and T3; 16 at T1 and T3, and 74 at T3 only. At T3, the 11th graders had studied in the learning environment for about 2 years. In total, 1,335 students participated in the study (50.6% girls, 49.4% boys).

The increase in the number of participants at T2 was partly due to one school's decision to allow only half of the students (i.e., classes) to participate at T1 of this study. One year later (T2), however, all 10th graders of this school participated. Furthermore, about 200 of the newly included participants at T2 were repeaters from an earlier cohort (i.e., the first year). About 20 students at T2 had been absent during data collection at T1. The attrition at T2 was likely due to incidental absence of students and nonpromotion from 9th to 10th grade.

The decrease in the number of participants at T3 was partly due to nonpromoted students who left the program and partly due to one school's decision to refrain from further data collection at T3. Because at each measurement (both at T2 and at T3), the nonpromoted students of an earlier cohort were added to the sample, a better representation of the population was created, and unwanted shifts or biases in the sample were avoided.

The achievement level of the participating schools on the general examination indicates that they are representative of schools in the Netherlands, with one school at the senior general education level scoring greatly above the national average and two schools at the preuniversity level scoring slightly above the average (Onderwijsinspectie [Dutch Inspection of Education], 2006). The percentage of students from cultural minorities at the participating schools ranged from 0.00% to 1.33% (national average is 2.55%; W. Wieldraaijer, Centraal Financiele Instellingen [Central Financial Institution], personal communication, January 8, 2007).

### Materials

*The learning environment.* The context of this study is a nationwide innovation in Dutch secondary education called the Second Phase (Ministerie van Onderwijs, Cultuur, en Wetenschap [Dutch Ministry of Education, Culture, and Science], n.d.; Stuurgroep Profiel Tweede Fase Voortgezet Onderwijs [Steering Committee for the Profile for the Second Stage of Secondary Education], 1995; Veugelers, de Jong, & Schellings, 2004). All schools in the Netherlands had to participate in this innovation. The Second Phase requires students to independently acquire skills and knowledge to better prepare them for higher professional education and university. Students learn in a self-directed way with possibilities for collaborative learning. There is more room for individual differences than in the traditional educational system, and teachers have to take these differences into account. The teacher's role is more like that of a coach and less like that of an instructor, which creates more possibilities for interaction between students and the teacher. The learning process is not only directed to knowledge acquisition but also to the selection and processing of the vast amounts of information available today. Furthermore, learning content is actualized and broadened because building a broad general knowledge base is an important goal of the Second Phase. Courses are clustered in profiles of closely interconnected topics (e.g., science and health, economics and society) that are meant to enable better integration of the subjects and lead to a better preparation for higher professional education and university. In addition, the coherence between knowledge and skills and the application of knowledge in subject-matter domains are emphasized.

The objective characteristics of the implementation of the Second Phase on the schools participating in this study are beyond the scope of this article. However, research has shown that—in general—its implementation with respect to stimulating student autonomy and differentiation are not convincingly perceived by teachers (Könings, Brand-Gruwel, & van Merriënboer, 2007). Teachers also do not perceive much freedom to deviate from lesson programs and regret this lack of freedom (Veugelers et al., 2004).

*Inventory of Expected Study Environment—Extended (IESEE) and Inventory of Perceived Study Environment—Extended (IPSEE).* The IESEE measures students' expectations of a forthcoming learning environment and their prospective dissatisfaction with regard to that environment. It is a parallel version of the IPSEE, which measures students' perceptions of a learning environment and their desires and actual dissatisfaction with regard to the design of the environment. Both IESEE and IPSEE consist of 44 items, partly based on the Inventory of Perceived Study Environment (IPSE; Wierstra, Kanselaar, van der Linden, & Lodewijks, 1999), which was translated into Dutch by the Expertise Center for Active Learning of Maastricht University (Picarelli, Slaats, Bouhuijs, & Vermunt, 2006).

The IESEE/IPSEE items are ordered in five scales (see Table 1) that can be seen as basic characteristics of PLEs. All items contain a statement about one of the characteristics of a learning environment and two statements, one related to the expectation/perception of a characteristic and one related to its desirability, as in the following example:

Table 1
*Internal Consistencies of the Scales of the Inventory of Expected Study Environment—Extended at T1 and the Inventory of Perceived Study Environment—Extended at T2 and T3*

| | | | Cronbach's alpha coefficient | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | T1 | | T2 | | T3 | |
| Scale | Description of scale | No. of items | Expectation | Dissatisfaction | Perception | Dissatisfaction | Perception | Dissatisfaction |
| Fascinating Content | Extent to which learning contents are interesting, challenging, and personally relevant for students | 9 | .82 | .72 | .85 | .81 | .85 | .84 |
| Productive Learning | Little emphasis on sole reproduction of learning contents but rather on an active process of making sense of the subject matter and creating mental models | 5 | .80 | .80 | .83 | .84 | .79 | .76 |
| Student Autonomy | Self-directedness with regard to contents and way of learning and planning | 15 | .81 | .82 | .85 | .88 | .84 | .88 |
| Interaction | Collaboration with peers and interaction with teacher | 11 | .68 | .65 | .73 | .71 | .68 | .73 |
| Clarity of Goals | Clarity of instructional goals and task demands | 4 | .75 | .69 | .81 | .79 | .83 | .82 |

*Note*. T = time of assessment (1, 2, or 3).

Students can decide for themselves how they wish to learn during the course.

(A). I expect this to happen (in the 10th grade)/This happens.

(B). I would like this to happen.

The statements are rated on a 6-point scale, ranging from *totally disagree* (1) to *totally agree* (6). Scores on Statement A give a measure of the student's expectation/perception of the learning environment. Scores on Statement B show what the student desires from the environment. For the IESEE, the difference between the scores on Statements B and A is defined as a measure of the prospective dissatisfaction with the forthcoming environment. For the IPSEE, the difference is a measure of the actual dissatisfaction with the perceived environment. Increasing differences indicate increasing dissatisfaction. Small differences indicate low dissatisfaction. It should be noted that low dissatisfaction could be interpreted as high satisfaction, but we used only the term *dissatisfaction* to interpret and present the results in a univocal way.

*Statistics of the IESEE.* Internal consistencies of the IESEE are presented in Table 1 (T1, Columns 1 and 2). The coefficients for the expectation items ranged from .68 for the Interaction Scale to .82 for the Fascinating Content Scale. With respect to dissatisfaction scores, the alpha coefficients ranged from .65 for the Interaction Scale to .82 for the Student Autonomy Scale. In total, 3 of 10 Cronbach's alpha coefficients were above .60; 2 were above .70, and 5 were above .80. To examine whether the five scales were sufficiently independent to warrant separate consideration, we computed pairwise correlations between the scales. Of the 20 correlations (10 over expectation data and 10 over prospective dissatisfaction data), all were below .50; the implication of this finding is that less than 25% of the variation on one scale can be explained by variation on the other scale. In addition, the tolerance was computed as a check for possible collinearity between scales. The tolerance measure, which has a range from 0 to 1, indicates serious collinearity if the values are below .10. It was computed separately for each of the five scales for perception and dissatisfaction data: The lowest value was .58, with six of the values being above .60. There was no statistical objection to consider the five IESEE-scales separately.

*Statistics of the IPSEE.* Internal consistencies were computed for all five scales for the perception items and the actual dissatisfaction scores separately at T2 and T3 (see Table 1, Columns 3–6). For the Fascinating Content Scale, the coefficients ranged between .81 and .85; for the Productive Learning Scale, between .76 and .83; for the Student Autonomy Scale, between .84 and .88; for the Interaction Scale, between .68 and .73; and for the Clarity of Goals Scale, between .79 and .83. In total, only 1 of 20 Cronbach's alpha coefficients was between .60 and .70; 6 were between .70 and .80, and another 13 were above .80. As for the IESEE-scales, correlations between the scales were computed over perception data and dissatisfaction data. At T2, 15 of 20 correlations were below .50, 4 were between .50 and .60, and 1 was above .60. The lowest tolerance value found at T2 was .45. Of the remaining values, 4 were above .50, and another 4 were above .60.

For T3, 15 correlations between the scales were below .50, and 5 were between .50 and .60. The lowest tolerance value was .49; 4 values were above .50, and another 4 were above .60. Thus, there are no statistical objections to considering the five scales separately.

*Inventory of Learning Styles for Secondary Education (ILS–SE).* The ILS questionnaire was originally developed to measure higher education students' learning styles (Vermunt, 1992) and was

adapted for students in secondary education by Vermunt, Bouhuijs, and Picarelli (2003). The questionnaire measures learning-related characteristics of students on the basis of their usual way of learning. The ILS–SE consists of 100 items. Because of the results of factor analyses, we decided to exclude a single item because of a small factor loading (< .40). The remaining 99 items were divided in five clusters: Processing strategies (cognitive activities students use to process learning contents), regulation strategies (the way students regulate their own learning process), motivational orientations (personal goals or motives students have for learning and going to school), conceptions of learning (mental models about learning), and affective processing strategies (emotional aspects of learning). Each of the five clusters contains several scales, which are presented in Table 2.

For each item in the ILS–SE, students rate the degree to which a statement corresponds to their own learning on a 5-point scale. Information about internal consistencies of the scales at T1 and T2 is included in Table 2. At T1, Cronbach's alpha ranged from .58 for the Intrinsic Motivation and Certificate-Oriented Motivation Scales to .87 for the Motivation/Concentration Problems and Fear of Failure Scales. At T2, the coefficients ranged from .63 for the Certificate-Oriented Motivation Scale to .87 for the Fear of Failure Scale. In total, 2 of 32 Cronbach's alpha coefficients were .58, 7 were above .60, 13 were above .70, and 10 were above .80, all of which are acceptable. By computing correlations and tolerance values, we tested the independence of the 16 ILS–SE-scales. Table 3 shows the correlations between the scales. It can be seen that 116 of the correlations were below .50, 3 were between .50 and .60,

Table 2
*Descriptions and Internal Consistencies of the Scales of the Inventory of Learning Styles for Secondary Education at T1 and T2*

| Scale | Description of scale | No. of items | Cronbach's alpha coefficient T1 | Cronbach's alpha coefficient T2 |
|---|---|---|---|---|
| | Processing strategy | | | |
| Deep processing | Relating and structuring knowledge elements and critical processing of information | 12 | .84 | .84 |
| Stepwise processing | Memorizing, rehearsing, studying information in detail | 8 | .81 | .80 |
| | Regulation strategy | | | |
| Self-regulation | Regulation of own learning process through activities like planning, monitoring, reflecting, and taking initiatives with respect to learning contents | 8 | .71 | .71 |
| External regulation | Learning processes to be regulated by external sources (i.e., books, teacher) | 6 | .68 | .66 |
| Lack of regulation | Difficulties with regulating learning and processing contents effectively | 4 | .66 | .71 |
| | Learning orientation | | | |
| Intrinsic motivation | Learning because of interest in learning content and the desire to develop oneself | 4 | .58 | .67 |
| Certificate oriented | Learning for passing tests, gaining high grades, and obtaining certificates | 5 | .58 | .63 |
| Vocation oriented | Learning for future study and professions | 4 | .73 | .77 |
| Ambivalent | Doubtful, uncertain attitude toward own capacities and chosen courses | 5 | .75 | .74 |
| | Conception of learning | | | |
| Construction and use of knowledge | Learning as constructing one's own knowledge, making it concrete, and applying it | 8 | .82 | .81 |
| Intake of knowledge | Learning as taking in information and memorizing or reproducing it | 4 | .64 | .64 |
| Cooperative learning | Preferring to learn in cooperation with fellow students | 3 | .70 | .76 |
| Stimulating education | Learning as a process continuously driven by teachers or textbooks | 5 | .78 | .79 |
| | Affective learning strategy | | | |
| Motivation/concentration problems | Difficulty with concentrating and staying motivated during learning, being easily distracted, and sometimes postponing-assignments | 8 | .87 | .86 |
| Fear of failure | Experiencing stress during learning, especially in testing situations, and having a negative self-image | 8 | .87 | .87 |
| Keeping a good state of mind | Having a positive opinion of own capacities, being self-confident, and performing activities to stay motivated and concentrated | 8 | .72 | .71 |

*Note*. T = time of assessment (1, 2, or 3).

Table 3
*Pearson's Correlations Between the Scales of Inventory of Learning Styles for Secondary Education at T1*

| Scale | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Deep processing | — | | | | | | | | | | | | | | |
| 2. Stepwise processing | .35** | — | | | | | | | | | | | | | |
| 3. Self-regulation | .68** | .53** | — | | | | | | | | | | | | |
| 4. External regulation | .28** | .54** | .39** | — | | | | | | | | | | | |
| 5. Lack of regulation | .14** | .16** | .16** | .16** | — | | | | | | | | | | |
| 6. Intrinsic motivation | .37** | .27** | .39** | .18** | −.06 | — | | | | | | | | | |
| 7. Certificate oriented | .04 | .35** | .14** | .33** | .07* | .05 | — | | | | | | | | |
| 8. Vocation oriented | .17** | .21** | .22** | .22** | .03 | .24** | .33** | — | | | | | | | |
| 9. Ambivalent | .01 | −.05 | .02 | −.08* | .41** | −.19** | −.11** | −.23** | — | | | | | | |
| 10. Construction and use of knowledge | .54** | .31** | .46** | .30** | −.03 | .41** | .18** | .42** | −.13** | — | | | | | |
| 11. Intake of knowledge | .01 | .27** | .09** | .32** | .31** | −.01 | .28** | .16** | .17** | .07 | — | | | | |
| 12. Cooperative learning | .19** | .12** | .22** | .16** | .16** | .08* | .07 | .16** | .13** | .29** | .25** | — | | | |
| 13. Stimulating education | .24** | .08* | .17** | .12** | .31** | .08* | .04 | .10** | .20** | .31** | .30** | .30** | — | | |
| 14. Motivation/concentration problems | −.10** | −.35** | −.29** | −.19** | .19** | −.18** | −.17** | −.15** | .23** | −.23** | .00 | −.05 | .12** | — | |
| 15. Fear of failure | .22** | .19** | .31** | .09* | .48** | .09** | .03 | −.01 | .38** | .04 | .22** | .20** | .20** | .06 | — |
| 16. Keeping a good state of mind | .37** | .32** | .37** | .33** | −.09** | .30** | .20** | .20** | −.21** | .39** | .02 | .09* | .07 | −.14** | −.06 |

*$p < .05$. **$p < .01$.

and only 1 was slightly above .60. The lowest tolerance value was .40, with 12 values above .60. Thus, there was no statistical objection to considering the 16 ILS–SE scales separately.

### *Procedure*

At T1, the participants filled out the IESEE and the ILS–SE. At T2, they filled out the IPSEE and the ILS–SE. At T3, they only filled out the IPSEE. Preceding the completion of a questionnaire, students received a short oral instruction about the goal and content of the questionnaire and about the way items had to be scored. This instruction was repeated on the first page of each questionnaire. The IESEE/IPSEE took between 30 and 40 min to complete; the ILS–SE took between 20 and 30 min. The participants filled out the questionnaires during regular school hours.

### *Data Analysis*

A maximum of 25% of missing values was accepted to compute the mean scores for each scale of the IESEE, IPSEE, and ILS–SE. If at least 75% of the items of a scale were filled out, these items were used to compute the mean score of that scale. For each scale, we could calculate a mean score using at least 95% of the participants. Dissatisfaction scores of the IESEE/IPSEE were computed as the difference between the desirability score and the expectation/perception score. To answer the research questions, we focused on students who had a positive attitude toward PLEs. This means that we analyzed only data of students who desired a particular characteristic of a learning environment to be more strongly implemented than they expected or perceived (i.e., desire − expectation/perception ≥ 0). In fact, there were also students who desired particular aspects of PLEs to be less strongly implemented, but these were rather small groups ( < 10% of all students for three scales, < 20% for two scales).

Since the longitudinal design had a nested data structure, with participants nested in classes (i.e., year groups) and classes nested in schools, we expected both serial correlations due to repeated measurements and intraclass correlations due to the multilevel structure. Data were analyzed with a longitudinal mixed model: Repeated measures were considered to be nested in participants, and participants were considered to be nested in classes. Because the number of schools was too small to permit inference to the population of schools, school was included as a fixed factor in the model to correct for correlations in the data due to nesting within schools. Thus, it is assumed that the five schools were representative of the wider population of schools. School and/or class was only included in the model if the effects was significant at a level of $p < .10$.

Apart from accounting for the multilevel structure of the data, the longitudinal mixed model analysis has two other advantages over traditional repeated measures analysis of variance (ANOVA). First, repeated measures ANOVA assumes that the residual variation can be described by a covariance structure known as sphericity. This is a highly restrictive assumption that is seldom realistic in the case of repeated measures. The longitudinal mixed model permits the specification of more realistic covariance structures. We opted for an unstructured covariance matrix, posing no restrictions on the values of residual variances and covariances. Second, repeated measures ANOVA discards each participant with a missing value on any of the three measurements. In contrast, the longitudinal mixed model makes use of maximum likelihood estimation. Under the assumption that cases are missing at random (MAR), participants with missing data on one or two measurements can still be used for estimation purposes. The MAR assumption is plausible in our case, so that mixed model analysis allowed for a more efficient use of the available data while still yielding unbiased estimates of effects.

A specific problem for analyzing data to answer Research Questions a, b, e, and f was the correction for class effects. Class composition changed over the time periods so that the same pupil could belong to three differently composed classes. We circumvented this problem by trying out a maximum of three different class corrections for each separate model. We first tried class as a

random factor by using the classes as composed at T1, then classes as composed at T2, and finally classes as composed at T3. In principle, this procedure could result in more significant class effects to be reported, but in practice, this did not pose a problem because the estimates of the fixed effects were unbiased, and the standard errors only marginally changed under the different class corrections. The tables that will be discussed in the Results section only report standard errors corrected for school effects (if relevant). If a significant class effect changed a parameter estimate from significant to nonsignificant or vice versa, we will explicitly discuss it in the text. In the following section, only results significant at a level of $p < .01$ are reported.

## Results

Table 4 presents the means and standard deviations of expectation scores (T1), perception scores (T2 and T3), and dissatisfaction scores (T1, T2, and T3).

### *Relationships Between Students' Reports on Different Measurement Moments*

To investigate how expectations of a learning environment predict perceptions of the future environment and how prospective dissatisfaction predicts actual dissatisfaction (i.e., Research Questions a and b), we conducted mixed model regression analyses to examine mutual relations between expectation scores at T1, perception scores at T2, and perception scores at T3. To investigate the relation between expectation scores at T1 and perception scores at T2, we tested a model with only data from T1 and T2: the perception score at T2 as a dependent variable and the expectation score at T1 as an independent variable. We examined the relations between expectation scores (at T1) and perception scores at T2 and T3 by building a model with perception scores at T3 as dependent variable and expectation scores at T1 and perception scores at T2 as independent variables. Testing this model provided insight in the relation between scores at T1 and T3 and between scores at T2 and T3. Because perception scores at both T2 and T3 were included in the model, the regression coefficient of the score at T2 was corrected for the score at T3 and vice versa. The regression coefficients represent the size of the unique part of the relation between the dependent and independent variable.

*Expectation and perception scores.* The left side of Table 5 presents the results of analyzing the mutual relations between expectation scores at T1 and perception scores at T2 and T3. The expectation scores at T1 had a significant positive effect on perception scores at T2 for all scales. Thus, the higher the expectation scores, the higher the perception scores at T2. Perception scores at T2 also had a significant positive effect on perception scores at T3. But as can be seen from Table 5, the direct effect of expectation scores (T1) on perception scores at T3 was nonsignificant for two scales and relatively small for the other scales. This result is likely due to the mediating role of the perception scores at T2. By including perception scores at T2 in the analyses, we corrected the results for this potential mediator and showed the size of the unique relation between scores at T1 and T3.

*Dissatisfaction scores.* Results for relations between dissatisfaction scores at T1, T2, and T3 (see the right side of Table 5) show that, for all scales, prospective dissatisfaction at T1 had a positive effect on actual dissatisfaction at T2, and dissatisfaction at T2 had a positive effect on dissatisfaction at T3. Prospective dissatisfaction at T1 had a direct positive effect on actual dissatisfaction scores at T3 on two of the scales, indicating a unique relation between the dissatisfaction scores at T1 and T3 for Fascinating Content and Clarity of Goals Scales.

In summary, the results for Research Questions a and b show robust relations between expectations and later perceptions. The higher students' expectations before entering the new learning environment, the higher their subsequent perceptions later on. Prospective dissatisfaction scores were positively related to actual dissatisfaction scores with the perceived learning environment.

### *Relationships Between Students' Reports at T1 and Learning-Related Student Characteristics.*

To investigate how expectations of the future learning environment are related to motivation and other learning-related student characteristics and how prospective dissatisfaction is related to these student characteristics (i.e., Research Questions c and d), we conducted mixed model regression analyses to analyze the relations between IESEE scores at T1 and learning-related student characteristics at T1. The learning-related student characteristics were included as independent variables in mixed model regression analyses. A backward procedure was used, in which the less

Table 4
*Means and Standard Deviations of Expectation and Perception Scores and Dissatisfaction Scores*

| | Expectation (T1)/perception (T2 & T3) score | | | | | | Dissatisfaction score | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T1 | | T2 | | T3 | | T1 | | T2 | | T3 | |
| Scale | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Fascinating Content | 3.46 | 0.82 | 3.10 | 0.85 | 3.12 | 0.86 | 1.35 | 0.80 | 1.77 | 0.96 | 1.82 | 0.96 |
| Productive Learning | 2.76 | 0.97 | 2.89 | 1.01 | 3.32 | 0.93 | 1.53 | 1.02 | 1.29 | 1.00 | 0.93 | 0.81 |
| Student Autonomy | 3.88 | 0.70 | 3.29 | 0.71 | 3.38 | 0.69 | 1.11 | 0.74 | 1.37 | 0.88 | 1.32 | 0.86 |
| Interaction | 3.98 | 0.64 | 3.70 | 0.65 | 3.74 | 0.62 | 0.77 | 0.57 | 0.94 | 0.64 | 0.92 | 0.64 |
| Clarity of Goals | 4.12 | 0.94 | 3.82 | 0.96 | 3.88 | 1.00 | 1.32 | 0.95 | 1.56 | 1.04 | 1.47 | 1.10 |

*Note*. Scales were from the Inventory of Expected Study Environment—Extended and the Inventory of Perceived Study Environment—Extended. T = time of assessment (1, 2, or 3).

Table 5
*Mixed Regression Coefficients of Scores for Expectation/Perception and for Prospective Dissatisfaction and Actual Dissatisfaction with the Perceived Learning Environment*

| | Expectation/perception score | | | Dissatisfaction score | | |
|---|---|---|---|---|---|---|
| Scale | *B* | *SE B* | β | *B* | *SE B* | β |
| | | | T1–T2 | | | |
| Fascinating Content | .46 | .03 | .44 | .57 | .06 | .40 |
| Productive Learning | .36[a] | .04 | .34 | .47 | .06 | .40 |
| Student Autonomy | .36[a] | .04 | .36 | .40[a] | .06 | .38 |
| Interaction | .39[a] | .04 | .38 | .34[a] | .06 | .36 |
| Clarity of Goals | .43[a] | .03 | .42 | .48[a] | .05 | .41 |
| | | | T2–T3 | | | |
| Fascinating Content | .48 | .05 | .48 | .54[a] | .05 | .54 |
| Productive Learning | .34[a] | .04 | .37 | .31 | .05 | .38 |
| Student Autonomy | .45[a] | .05 | .45 | .56[a] | .05 | .59 |
| Interaction | .52 | .04 | .55 | .52[a] | .05 | .53 |
| Clarity of Goals | .56 | .05 | .54 | .55 | .05 | .54 |
| | | | T1–T3 | | | |
| Fascinating Content | .21 | .05 | .20 | .18[a] | .06 | .15 |
| Productive Learning | .23[a] | .04 | .24 | *ns* | | |
| Student Autonomy | *ns* | | | *ns* | | |
| Interaction | *ns* | | | *ns* | | |
| Clarity of Goals | .13 | .05 | .12 | .21 | .05 | .19 |

*Note.* Coefficients: $p < .01$. Scales were from the Inventory of Expected Study Environment—Extended and the Inventory of Perceived Study Environment—Extended. Standard errors were based on estimation of fixed effects without correction for class effects but with correction for school effects (if $p_{\text{school}} < .10$). Additional correction for class effects did not change the significance of the result, unless stated in text. T = time of assessment (1, 2, or 3).
[a]Corrected for school effects.

significant variables were removed one by one, until all included variables were significant ($p < .01$).

*Expectation Scores and Learning-Related Student Characteristics.* Table 6 presents the results on relations between expectation scores and learning-related student characteristics. As can be seen from this table, some student characteristics were related to expectation scores on several scales. These will be described in more detail. Intrinsic motivation was positively related to students' expectation scores for the Fascinating Content, Student Autonomy, Interaction, and Clarity of Goals Scales. The conception of learning as the construction and use of knowledge was also frequently related to high expectation scores: The stronger this conception, the higher students' expectations were with respect to Fascinating Content and Student Autonomy Scales. Furthermore, the use of external regulation strategies was positively related to expectation scores for Interaction and Clarity of Goals Scales. Finally, the report of fear of failure was negatively related to expectation scores for Student Autonomy and Clarity of Goals Scales. Thus, the higher the reported fear of failure was, the lower the expectations on these scales.

With respect to the formulated hypotheses about the relation between motivation and expectations for the Fascinating Content and Clarity of Goals Scales, the results show that motivational orientations were, for those scales, indeed related to expectations. For both scales, intrinsic motivation was related to holding higher expectations on how the future learning environment would look. Expectations for Fascinating Content were negatively related to problems with motivation and concentration, while the ambivalent motivational orientation especially was negatively related to expectations about Clarity of Goals. As can be seen from Table 6, expectation scores for both scales were also related to some other learning-related student characteristics.

In summary, the results show that learning-related student characteristics were related to expectations of the future environment and, mostly, in a consistent fashion related to either higher or lower expectation scores. Especially, students reporting fear of failure tended to expect a less powerful learning environment, while students with an intrinsic motivational orientation and students with a constructivist conception of learning tended to expect the future environment to be a more powerful one.

*Prospective Dissatisfaction Scores and Learning-Related Student Characteristics.* Table 7 presents results of mixed model regression analyses on the prospective dissatisfaction data. Some of the student characteristics were often related to dissatisfaction scores, either positively or negatively. An intrinsic motivational orientation was negatively related to prospective dissatisfaction scores for four scales. The stronger students' intrinsic motivation for learning was, the lower their prospective dissatisfaction scores on the Fascinating Content, Productive Learning, Student Autonomy, and Clarity of Goals Scales. Also, the conception of learning as construction and use of knowledge was related to low prospec-

Table 6
*Significant Results of Mixed Model Analyses, Showing Relations Between Expectations and Learning-Related Student Characteristics*

| Dependent variable/scale | Independent variable | *B* | *SE B* | β |
|---|---|---|---|---|
| Fascinating Content | | | | |
| | Intrinsic motivation | .39 | .04 | .31 |
| | Construction and use of knowledge | .31 | .04 | .27 |
| | Motivation/concentration problems | −.12 | .03 | −.14 |
| Productive Learning[a] | | | | |
| | Intake of knowledge | −.22 | .04 | −.16 |
| | Motivation/concentration problems | −.12 | .04 | −.12 |
| | Stepwise processing | −.16 | .05 | −.13 |
| | Deep processing | .15 | .06 | .10 |
| Student Autonomy[a] | | | | |
| | Construction and use of knowledge | .18 | .04 | .20 |
| | Fear of failure | −.11 | .03 | −.11 |
| | Intrinsic motivation | .11 | .04 | .10 |
| Interaction[a] | | | | |
| | External regulation | .16 | .03 | .18 |
| | Intrinsic motivation | .14 | .03 | .15 |
| Clarity of Goals[a] | | | | |
| | Ambivalent | −.19 | .05 | −.17 |
| | External regulation | .18 | .05 | .14 |
| | Intrinsic motivation | .18 | .05 | .12 |
| | Fear of failure | −.13 | .05 | −.09 |

*Note.* Significant results: $p < .01$. Scales were from the Inventory of Expected Study Environment—Extended and the Inventory of Perceived Study Environment—Extended. Standard errors were based on estimation of fixed effects without correction for class effects, but with correction for school effects (if $p_{\text{school}} < .10$). Additional correction for class effects did not change the significance of the result, unless stated in text.
[a]Corrected for school effects.



tive dissatisfaction, especially for Productive Learning and Interaction Scales.

Positively related to prospective dissatisfaction was an ambivalent motivational orientation: The stronger students' ambivalent motivation, the higher their prospective dissatisfaction scores for the Fascinating Content, Interaction, and Clarity of Goals Scales. Problems with motivation and concentration were related to higher prospective dissatisfaction scores for Fascinating Content, Productive Learning, and Student Autonomy Scales. Another three student characteristics were also related to higher prospective dissatisfaction scores: the conception of learning as intake of knowledge, the certificate-learning orientation, and the affective strategy keeping good state of mind (each for two IESEE scales).

The analyses of prospective dissatisfaction scores and learning-related student characteristics reveal that some student characteristics, and particularly intrinsic motivation, are related to low prospective dissatisfaction scores. Other student characteristics, such as an ambivalent motivational orientation and problems with motivation and concentration, are related to high prospective dissatisfaction scores.

Summarizing, results for Research Questions c and d show that learning-related student characteristics are related to expectations. Fear of failure was frequently related to lower expectations, whereas intrinsic motivation and a conception of learning as the construction and use of knowledge were related to higher expectations. Prospective dissatisfaction was often related to an ambivalent motivational orientation and problems with motivation and concentration. Intrinsic motivation was frequently related to low prospective dissatisfaction.

### *Mismatch Between Expectations and Perceptions and Development of Student Characteristics*

To examine whether students' perceptions of an environment are in line with their expectations of it (i.e., Research Question e), we used a longitudinal mixed model analysis. For testing longitudinal effects over time, *F* values were computed, and for identifying the exact differences among the three times of measurement, pairwise comparisons with Bonferroni correction were conducted, and Cohen's *d* effect size was computed. Only differences with $d > .20$ are described in the text.

For investigating the relation between the size of the mismatch between expectations and later perceptions and the development of learning-related student characteristics in the same period (i.e., Research Question f), we conducted mixed model regression analyses in the same way as the analyses for Research Questions c and d. The mismatch between expectation scores at T1 and perception scores at T2 (T2 − T1) ranged from –5, indicating a large decrease in scores from T1 to T2 and strong disappointment, to +5, indicating a large increase in scores from T1 to T2 and thus much higher perceptions than previously expected. Changes in each learning-related student characteristic (T2 − T1) were included as independent variables in the model. By using a backward procedure, we built a model that only contained variables that were significant at $p < .01$ ($p_{\text{school/class}} < .10$).

*Expectation and Perception Scores.* Table 8 shows the results of the mixed model longitudinal analyses on expectation and perception scores. The results of the *F* tests show that significant longitudinal effects existed on all scales of the IPSEE ($p < .01$). The differences between expectation scores (T1) and perception scores (T2) show that the scores decreased on four of the five

Table 7
*Significant Results of Mixed Model Analyses, Showing Relations Between Prospective Dissatisfaction and Learning-Related Student Characteristics*

| Dependent variable/scale | Independent variable | *B* | *SE B* | β |
|---|---|---|---|---|
| Fascinating Content[a] | | | | |
| | Intrinsic motivation | −.28 | .04 | −.23 |
| | Certificate oriented | .23 | .05 | .16 |
| | Motivation/concentration problems | .15 | .03 | .16 |
| | Ambivalent | .14 | .04 | .13 |
| Productive Learning | | | | |
| | Motivation/concentration problems | .21 | .04 | .15 |
| | Intrinsic motivation | −.21 | .06 | −.12 |
| | Construction and use of knowledge | −.22 | .06 | −.12 |
| | Intake of knowledge | .13 | .05 | .08 |
| | Keeping good state of mind | .15 | .06 | .09 |
| Student Autonomy | | | | |
| | Motivation/concentration problems | .12 | .03 | .13 |
| | Certificate oriented | .15 | .05 | .10 |
| | Intrinsic motivation | −.11 | .04 | −.09 |
| Interaction[a] | | | | |
| | Cooperative learning | .13 | .03 | .16 |
| | Construction and use of knowledge | −.19 | .04 | −.19 |
| | Deep processing | .14 | .04 | .13 |
| | Ambivalent | .09 | .03 | .10 |
| | Keeping good state of mind | .10 | .03 | .10 |
| Clarity of Goals | | | | |
| | Intrinsic motivation | −.20 | .05 | −.14 |
| | Fear of failure | .15 | .05 | .13 |
| | Ambivalent | .14 | .05 | .12 |
| | Intake of knowledge | .12 | .04 | .09 |

*Note.* Significant results: $p < .01$. Scales were from the Inventory of Expected Study Environment—Extended and the Inventory of Perceived Study Environment—Extended. Standard errors were based on estimation of fixed effects without correction for class effects, but with correction for school effects (if $p_{school} < .10$). Additional correction for class effects did not change the significance of the result, unless stated in text.
[a]Corrected for school effects.

scales, indicating disappointing perceptions compared with the expectations. The effect size was large for the Student Autonomy Scale (.84). For most scales, the differences between perception scores at T2 and T3 showed no significance. An increase of perception scores from T2 to T3 was found only for the Productive Learning Scale. Apparently, students perceived this element of the environment as being present more strongly at T3 than at T2. Scores on the Productive Learning Scale, notably, increased year after year (from T1 to T2, and from T2 to T3). However, the most striking result is the large decline of expectation scores at T1 and perception scores at T2 on the majority of the scales. Apparently, the perceived learning environment did not meet students' expectations.

*Relations Between Disappointment and Development of Student Characteristics.* Results revealed that a decrease from expectation scores (T1) to perception scores (T2) on the Fascinating Content Scale was related to a decrease in intrinsic motivation ($B = .24$; $SE\ B = .05$; $\beta = .20$), a decrease in reported use of deep processing strategies ($B = .20$; $SE\ B = .05$; $\beta = .13$), and an increase in fear of failure ($B = -.21$; $SE\ B = .04$; $\beta = -.18$) from T1 to T2. Thus, the larger the disappointment, the more intrinsic motivation and use of deep processing strategies decreased, and

Table 8
*Results of Mixed Model Analyses on Longitudinal Data of Expectations (T1) and Perceptions (T2 and T3)*

| | | | T2–T1 | | | T3–T2 | | |
|---|---|---|---|---|---|---|---|---|
| Scale | *F* | *df* | Δ | *SE* | *d* | Δ | *SE* | *d* |
| Fascinating Content | 76.38* | 2, 368.59 | −.36* | .03 | .43 | −.02 | .03 | .02 |
| Productive Learning | 98.72* | 2, 618.65 | .13* | .04 | .13 | .41* | .04 | .42 |
| Student Autonomy | 243.21* | 2, 582.42 | −.59* | .03 | .84 | .07 | .03 | .10 |
| Interaction | 65.90* | 2, 501.33 | −.28* | .03 | .44 | .05 | .02 | .08 |
| Clarity of Goals | 45.80* | 2, 428.35 | −.33* | .04 | .35 | .02 | .04 | .02 |

*Note.* Scales were from the Inventory of Expected Study Environment—Extended and the Inventory of Perceived Study Environment—Extended. Standard errors were based on estimation of fixed effects without correction for class effects, but with correction for school effects (if $p_{school} < .10$). Additional correction for class effects did not change the significance of the result, unless stated in text. T = time of assessment (1, 2, or 3).
* $p < .01$.

the more fear of failure increased. For the Student Autonomy Scale, disappointment was related to an increase in fear of failure ($B = -.15$; $SE\ B = .04$; $\beta = -.14$) and a decrease in deep processing ($B = .16$; $SE\ B = .05$; $\beta = .11$). For the Interaction Scale, disappointment was related to a decrease in deep processing strategies ($B = .16$; $SE\ B = .05$; $\beta = .13$), a decrease in considering learning as a cooperative activity ($B = .08$; $SE\ B = .03$; $\beta = -.11$), and an increase in the ambivalent motivational orientation ($B = -.10$; $SE\ B = .04$; $\beta = .10$). For the Clarity of Goals Scale, disappointment was related to a decrease in intrinsic motivation ($B = .18$; $SE\ B = .05$; $\beta = .13$) and in keeping a good state of mind ($B = .20$; $SE\ B = .06$; $\beta = .13$). Productive Learning was the only scale showing an increase in scores from T1 to T2. Exceeding the expectations for the Productive Learning Scale was related to a decrease in the conception of learning as intake of knowledge ($B = -.15$; $SE\ B = .05$; $\beta = -.10$) and a decrease in fear of failure ($B = -.15$; $SE\ B = .06$; $\beta = -.10$).

Summarizing, results for Research Questions e and f showed that students' perceptions of the new learning environment on most scales did not meet their expectations and that disappointment was related to undesirable changes in learning-related student characteristics, especially to an increase in fear of failure, a decrease in deep processing, and a decrease in intrinsic motivation.

## Discussion

The current study aimed to shed light on the role of expectations in education, especially expectations students have of a future learning environment. Because students move to new learning environments several times during their school career, it is relevant to gain insight in their expectations and subsequent perceptions of these new environments and to investigate how learning-related student characteristics relate to those expectations.

Research Questions a and b focused on the relations between expectations of how the future learning environment would look and later perceptions and relations between prospective dissatisfaction and actual dissatisfaction while perceiving the environment. Expectations were positively related to subsequent perceptions of the environment for all measured aspects of the environment. Thus, the higher the expectations beforehand, the higher the perceptions later on, and the lower the expectations beforehand, the lower the perceptions later on. Perceptions measured at the second and third time were also clearly positively related. Additionally, prospective dissatisfaction with the new environment was related to actual dissatisfaction after 1 year, and dissatisfaction after 1 year of participating in the environment was related to dissatisfaction after 2 years.

The relations between expectations/perceptions and dissatisfaction over time may well be explained by the cognitive biases described in the introduction of this article (see, e.g., Olson et al., 1996). People selectively pay attention to information consistent with their expectations and also interpret this information in such a way that their expectations are confirmed. Additionally, people create self-fulfilling prophecies because they behave in agreement with their expectations.

For Research Questions c and d, relations between expectations and learning-related student characteristics were investigated, as well as the way prospective dissatisfaction was related to those characteristics. Having an intrinsic motivational orientation and conceiving of learning as the construction and use of knowledge are both related to higher expectations of the new environment. Reporting fear of failure frequently relates to low expectations; thus, students who report a strong fear of failure are more reserved in their expectations of the future environment. These findings confirm the assumed relation between motivation and expectations but also show that expectations are influenced by conceptions of learning and affective processing strategies.

Prospective dissatisfaction with the new learning environment is negatively related to intrinsic motivation for learning; that is, intrinsically motivated students think they will be satisfied with the new environment. On the contrary, motivation/concentration problems and an ambivalent motivation are strongly related with high prospective dissatisfaction; students with these characteristics think they will be unhappy with the new environment.

The finding that high expectations are related to high intrinsic motivation and an active view on learning is in agreement with the relation between positivism and "engagement," proposed by Carver and Scheier (2001). Low expectations are especially related to fear of failure. It would be an oversimplification to consider this as a form of "low engagement." Students with fear of failure prefer a high degree of structure, clearness, stability, and continuity in their learning environment (Hermans, 1975). They are averse to unexpected and unfamiliar situations. Low expectations of the new and thus unfamiliar learning environment are better understandable in this context.

The finding that high prospective dissatisfaction with the new environment is, among other things, related to problems with motivation and concentration and to an ambivalent motivational orientation fits in the expectancy-value model (Carver & Scheier, 2001; Eccles & Wigfield, 2002). That model holds that discrepancies between expectations and personal values influence persistence and the amount of effort invested in learning and may induce a sense of doubt or negative thinking. Ambivalent motivation and problems with motivation and concentration are clear signals of doubt and negativism, and they thus may indicate a lack of persistence and unwillingness to invest effort in learning. The finding that intrinsic motivation for learning relates to low prospective dissatisfaction is in agreement with results on positive thinking and feeling confident, as described in the literature. Literature about expectations and motivation proposes causality between expectations and motivation, but it is well imaginable that the effect is bidirectional. A well-motivated student may recognize the utility of course contents more than a less-motivated student. Since the main focus of our study was trying to understand student expectations, we have focused on expectations as dependent variables and investigated whether there are more (or other) student characteristics than motivation that relate to students' expectations and prospective dissatisfaction. We could only test this by including student characteristics as independent variables, to be related to expectations/prospective dissatisfaction on a particular characteristic of the learning environment. In this way, it became clear that, besides motivation, fear of failure and certain conceptions of learning also relate to expectations.

Research Questions e and f concerned possible discrepancies between expectations of the new environment and later perceptions of it. We sought to determine whether students' expectations of an innovative learning environment in Dutch secondary education were met (i.e., Research Question e). Results clearly

show that students' perceptions of the new environment fell short of their expectations. Expectations were higher than the perceptions after 1 year with respect to Fascinating Content, Student Autonomy, Interaction, and Clarity of Goals Scales. The Productive Learning Scale was the only aspect for which perceptions exceeded the expectations after 1 year and for which perceptions increased even further in the second year. This is a positive finding, because the innovative environment indeed aimed to stimulate active processing and application of knowledge, rather than reproductive learning. However, the disappointing perceptions of the other aspects of the environment are worrying. Apparently, the Second Phase is implemented in such a way that students do not perceive its valuable aspects as much as they had expected beforehand. This is problematic because perceptions direct students' learning behavior (Entwistle, 1991), which eventually determine whether educational goals of the environment will be reached.

Results on relations concerning the mismatch between expectations and perceptions and the developments in student characteristics (i.e., Research Question f) indicate that a mismatch is related to negative changes in student characteristics. Disappointment is related to increasing fear of failure, lower intrinsic motivation, and less use of deep processing strategies. Negative effects of disappointment were proposed by Carver and Scheier (2001) and by the expectancy-value model (Eccles & Wigfield, 2002), but our results further refine the nature of these effects.

A first theoretical implication of our findings is that principles from general psychological research on expectations are also applicable to an educational setting, in particular, a setting in which students are confronted with the implementation of a new learning environment. A second implication is that the concept of expectations deserves a much more prominent place in educational research than it has today. As shown in our study, students' expectations of a new learning environment are not automatically in line with later perceptions, and, even more important, expectations strongly influence the way they perceive the environment after it has been implemented. Perceptions are likely to determine students' learning behaviors and, consequently, the effectiveness of the learning environment. Gaining more insight into the role of student expectations is thus of utmost importance in developing guidelines for the design of PLEs, preferably in such a way that students' expectations are taken into account.

A practical implication of our findings is that schools and teachers should carefully prepare their students for curricular changes or innovations. The quality and quantity of information that students receive on the characteristics of a new learning environment before they start to work in it should be carefully determined to help them build proper expectations. If at all possible, disappointing perceptions should be prevented. Students with a high fear of failure are particularly vulnerable in situations of change: They should be given extra support and structure before and during the implementation of a new environment.

A limitation of the current study is that students were always forced to report their expectations of the environment in the questionnaire, regardless of the clearness of their expectations, and it is unknown how students formed their expectations and which sources of information they used to form them. Future research should focus on the origin of the expectations, including the sources that students use to form them (e.g., press, siblings, peers, parents), in order to gain more insight into the processes yielding the expectations that students reported in this study. This can provide more insight into the nature of expectations in an educational setting and might help researchers to develop a theory of how expectations can best be dealt with in educational design. Furthermore, knowledge about the origin of expectations would provide schools with valuable information that they could use to optimize their preparation of students for curricular changes and innovations. In line with this, future research should also address the question of how the process of forming expectations could be influenced to result in more accurate expectations, that is, expectations that match later perceptions.

To conclude, this study showed that expectations of a learning environment deserve a prominent role in educational research and praxis. Students do not automatically form proper expectations of a new environment such as the Second Phase in Dutch secondary education. Nevertheless, these expectations influence their perceptions of the new environment. Disappointing perceptions are likely to decrease the effectiveness of the environment and are also related to undesirable changes in learning-related student characteristics. More effective approaches are needed to prepare students for large educational changes; such approaches should also take into account differences in individual learning characteristics and related prospective ideas. It would be highly beneficial for educational design if guidelines were developed that took into account students' expectations of curricular changes or innovations.

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