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Assessment of Students' Situation-Specific Classroom Engagement by an InSitu Instrument

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Abstract

The present study aims to expand the current understanding of engagement by examining variations in students' situation-specific engagement in lower secondary school. In addition, the validity and reliability of a new situation-specific InSitu Instrument were examined. The sample consisted of 1,809 Finnish students attending Grade 7. The students filled in mobile ratings on their lesson-specific engagement after lessons. Furthermore, they answered questionnaires concerning their overall engagement, achievement beliefs, and task values in math and literacy. The results showed substantial variation within and between students in situational engagement. A five-factor structure was identified for the InSitu ratings: 1) behavioral engagement, 2) emotional engagement, 3) competence experiences, 4) disaffection, and 5) help seeking. Correlational analyses showed moderate to high associations between situation-specific engagement and student engagement, achievement beliefs, and task values. The findings provide support for the InSitu Instrument as a valid and reliable tool for investigating situation-specific engagement in the classroom.

Keywords: situation-specific classroom engagement; student engagement; learning motivation; mobile ratings; lower secondary school

1. Introduction

Student engagement and learning motivation are fundamental components of the learning process: engaged students show behavioral involvement in learning and positive emotional tone, whereas disengaged students are easily bored, give up learning tasks, and display negative emotions (Fredricks, Blumenfield, & Paris, 2004; Wigfield & Cambria, 2010). Previous research in the field includes a critical limitation: a vast majority of previous studies draw from students' self-reports of their overall engagement or learning motivation (e.g., achievement beliefs and task values), and students' situation-specific engagement has seldom been studied. This is surprising because the investigation of student engagement in lessons is likely to increase our understanding of the nature and fluctuation of student engagement from one lesson to another. Understanding such complexity can help to design more targeted interventions for students showing early signs of disengagement in learning. In the present study, we used mobile technology to collect intensive data on lesson-specific engagement among lower secondary school students. Our aim was to expand the current understanding of engagement by examining variations in secondary school students' situation-specific engagement and to examine the validity and reliability of a new situation-specific In Situations (InSitu) Instrument.

1.1 Student Engagement

Student engagement refers to active participation with academic work shown through commitment and involvement in learning tasks (Appleton, Christenson, Kim, & Reschly, 2006; Skinner & Pitzer, 2012). Engagement is defined as a multidimensional construct that is typically seen to consist of three major components: (1) behavioral engagement, such as concentration and persistence in academic and social activities in the classroom; (2) emotional engagement, encompassing reactions to

teachers, classmates, academics, and schools; and (3) cognitive engagement, which involves the effort to comprehend complex ideas and master difficult skills (Fredricks et al., 2004). However, some recent studies have found this three-dimensional portrayal incomplete and proposed a fourth aspect of student engagement, which refers to students' active interaction in the classroom, e.g., the extent to which the students seek help and ask questions from classmates and teacher (e.g., Reeve, 2013). Moreover, definitions of engagement differ concerning whether they include the opposite of the engagement, i.e., *disengagement* (Miceli & Castelfranchi, 2000) or *disaffection* (Skinner & Belmont, 1993; Skinner, Kindermann, & Furrer, 2009), as a separate scale. Skinner et al. (2009) operationalized disaffection as lack of attention and emotions that reflect enervated emotion, such as tiredness and boredom. Thus, disengagement can be described as a separate construct from emotional engagement, which assesses rather students' positive emotions such as interest and enjoyment, i.e., emotions that reflect energized emotional states.

There are a number of previous studies and empirical evidence indicating that student engagement is an important predictor of school achievement (e.g., Appleton, Christenson, & Furlong, 2008; Fredricks et al., 2004), and educational plans and choices (Finn & Zimmer, 2012; Vasalampi, Salmela-Aro, & Nurmi, 2009). Several studies have shown, however, that lower secondary school students in particular repeatedly describe experiences in classrooms that lead to disengagement and alienation (Roeser, Eccles, & Sameroff, 2000; Skinner & Pitzer, 2012). It is thus important to increase the understanding of the contextual factors that promote or impede engagement.

In spite of the recent increase in research on engagement, the understanding of the dynamics of engagement in day-to-day classroom situations is limited (see Eccles & Wang, 2012; Fredricks et al., 2004). In order to understand how lesson context contributes to student engagement, more detailed process-oriented information is needed on student engagement over short-time periods and at a high intensity. Such knowledge about engagement in various classroom situations would enhance our understanding of how these phenomena evolve from one lesson to another. Capturing situation-specific experiences of engagement is necessary for disentangling the extent to which these experiences represent general tendencies measured in previous studies and the extent to which they vary over time and are dependent on school-related factors, such as school subjects (see e.g., Eccles & Wang, 2012).

The few existing studies focusing on situational engagement or motivation have found substantial variations in situational experiences. Tsai, Kunter, Lüdtke, Trautwein, and Ryan (2008) were among the first to investigate students' motivation experiences in the classroom over a relatively short period of time. They examined student interests (i.e., interest and value of the subject) with short questionnaires at the end of each lesson over three weeks (an average of eight lessons) and estimated that between 36% and 45% of the variance of motivation could be located at the within-student level or between lessons. Malmberg, Pakarinen, Vasalampi and Nurmi (2015) used mobile technology and examined situation-specific experiences of motivation (autonomous and controlled motivation) across learning situations over the course of one week and found substantial within-student variability, particularly in autonomous motivation (i.e., in interest and importance) between learning situations. Likewise, Martin et al. (2015) examined secondary school students' motivation and engagement in respect to adaptive and maladaptive motivation and engagement using a mobile

device where students were asked to rate themselves up to three times each day of the school week for four weeks. The results showed that the within-day (intra-individual) variability was stronger than variability between days or weeks. Consequently, the present study aimed at providing more information on students' classroom experiences contributing to their engagement and motivation.

1.2 Current Study

The few studies that have empirically examined students' lesson-specific classroom experiences (Malmberg et al., 2015; Martin et al., 2015; Tsai et al., 2008) indicate that secondary school students' effort and success evaluations during and after lessons can be reliably studied using mobile technology allowing online recording. For example, Martin et al. (2015) showed that mobile technology allows conducting participant-friendly data collection. Use of such technology devices enable the collection of multiple records from each participant, leading to an intensive longitudinal dataset (Walls & Schafer, 2006). The present study, we collected data on students' lesson specific classroom experiences with smartphones after several lessons using 18 questions that assessed five components of engagement and motivation (participation in class, concentration on tasks, affects and disaffects during the lesson, competence experiences, and help seeking). The study had three aims: First, to examine whether there is intra-individual variation in lower secondary school students' engagement and motivation from one lesson to another. Second, to investigate the factor structure of a newly developed instrument (InSitu) that investigates students' situation-specific classroom engagement. Third, to examine the concurrent validity of this newly developed instrument by investigating the associations between the subscales of the instrument and more traditional questionnaires assessing students' overall engagement and motivation (student engagement, achievement beliefs, and task values).

2. Method

2.1 Participants

This study is part of an extensive follow-up study (First Steps; Lerkkanen et al., 2006–2016) comprising of about 2000 students from the beginning of their kindergarten year to the end of 9th grade, with simultaneous data gathering from their parents and teachers. The sample is drawn from four municipalities in different parts of Finland; in three of these, the whole age cohort participated, and in the fourth municipality, the participating students comprised approximately half of the age cohort. The aim of the research project is to investigate students' academic and motivational development from the beginning of their school career through to their comprehensive school years. Parents were asked to give their written consent for their child's participation in the study.

The sample of the present study consisted of 1809 students (47% girls) attending Grade 7 (age 13-14 years). These students answered to questionnaires regarding their student engagement, task values, and achievement beliefs at the end of Grade 7. A subsample of 901 of these students reported their situation-specific experiences after several lessons over 11 weeks in the spring term using smartphones (M = 2.79 ratings for a student, range 1–17). This subsample was selected from among those participating in the longitudinal follow-up based on two criteria: (1) a high number of the students in the classroom were participants of the longitudinal follow-up, and (2) teachers' willingness to participate in data collection. Mobile-ratings were gathered after randomly selected lessons. Lessons included 16 different subjects: 986 ratings were gathered in literacy, 744 in math, 191 in science, 136 in student counselling, 66 in Swedish, 67 in handicraft and art, 62 in religion, 61 in English, 58 in home economics, 49 in physical education, 48 in history, 28 in biology, and 15 in

music. Altogether, 2511 ratings were gathered from 29 schools and from 77 classrooms. As there was a difference in number of students who answered only the questionnaires and those who answered both questionnaires and provided mobile ratings, we tested whether the results would change if only those who answered the mobile ratings were taken into account. However, because the results were similar to those using full data, we reported the results in which we used the full data.

2.2 Measures

2.2.1 Situation-specific experiences of engagement.

Students' situation-specific experiences of engagement after a lesson were assessed using a mobile application of the In Situations (InSitu) Instrument (Lerkkanen, Vasalampi, & Nurmi, 2012). The final InSitu Instrument consisted of 18 items, which are presented in Table 1. They assessed students' participation in class, concentration on tasks, affects and disaffects during the lesson, competence experiences, and help seeking (i.e., different aspects of classroom engagement). The items were rated immediately at the end of each school lesson with a 5-point scale (1 = not at all; 5 = very much). Ratings took around 2-3 minutes per student.

The measurement was piloted before the present study. First, in 2013, the first pilot mobile ratings were administered in two lower secondary classrooms (two lessons each). For this pilot study, the first draft of our questionnaire using mobile technology was coded. In the second pilot, in 2014, we piloted the present items of the rating scale in four classrooms (two lessons each). Analyses of the factor structure of the InSitu Instrument were carried out with exploratory factor analyses using maximum likelihood with direct oblimin as the rotation method in the SPSS 19 context. The results of the analysis suggested four factors. However, because the eigenvalue of the fifth factor was

also close to one (.843) and five factors clarified the contents of the factors, we ended up with a solution of five factors.

2.2.2 Student engagement.

Student engagement was measured using a Finnish short version (Virtanen, Lerkkanen, Poikkeus, & Kuorelahti, 2014) of the Student Engagement Instrument (SEI; Appleton et al., 2006). It consists of 18 of the original 34 items rated on a 4-point scale (1 = completely disagree, 4 = completely agree). The factor structure of the shortened 18-item scale was examined with confirmatory factor analysis using the Mplus statistical package (version 7.01; Muthén & Muthén, 1998–2012). The parameters of the models were estimated with full information maximum likelihood (FIML) estimation with non-normality robust standard errors (MLR estimator). Based on theoretical assumptions of the dimensions of SEI, a five factor solution was carried out. The model fit was excellent: $\chi^2(125; n = 1734) = 554.403$, $p < .001$; CFI = 0.96, RMSEA = 0.05, SRMR = 0.04. The factor structure was consistent with the original SEI, confirming the expected five factors with standardized factor loadings ranging between .57 and .87. All loadings were significant at $p < .001$. Correlations between the factors ranged between .31 and .70. The five-factor solution included the following scales: *control and relevance of school work* (six items, α = .81, e.g., "When I do schoolwork, I check to see whether I understand what I'm doing"), *teacher–student relationship* (three items; α = .88, e.g., "At my school, teachers care about students"), *future aspirations and goals* (three items, α = .86, e.g., "Going to school after high school is important"), *peer support in learning* (three items, α = .84, e.g., "Other students at school care about me"), and *family support in learning* (three items; α = .81, e.g., "When I have problems at school, my family/guardian(s) are willing to help me").

2.2.3 Task values.

Students' task values (Eccles et al., 1993; Eccles, 2005) were assessed with 12 items asking them to rate (1) how important, (2) how useful, and (3) how interesting they thought that math and literacy (mother tongue) were as school subjects. Each of the three dimensions of task value were assessed using two items for both math and literacy. Ratings were given on a 5-point scale (1 = not at all, 5 = very much). For math, Cronbach's alphas for importance, usefulness, and interest were .88, .76, and .87, respectively. For literacy, Cronbach's alphas for importance, usefulness, and interest were .85, .79, and .82, respectively.

2.2.4 Achievement beliefs.

Students' achievement beliefs were assessed using a shortened version of the Achievement Beliefs Scale for Children (ABS-C; Aunola & Nurmi, 2006). Students were presented with ten statements regarding their typical thoughts and behaviors in academic situations (e.g., "I enjoy working even on challenging school tasks"; "I sometimes delay starting on a task"), and they were asked to evaluate these statements on a 5-point scale (1 = not true, 5 = very much true). The factor structure of the shortened scale was assessed with confirmatory factor analysis using the Mplus statistical package (version 7.01; Muthén & Muthén, 1998–2012). The parameters of the models were estimated using FIML estimation with non-normality robust standard errors (MLR estimator). Based on the CFA two items ("It is nice to come to school; "I don't like coming to school) were excluded as their contents were not consistent with other items, and one item was omitted ("I like doing school tasks") because it load significantly onto several factors. After these changes and after letting residuals of variance correlate, the model fit was excellent: $\chi^2(12; n=1733) = 60.24$, $p < .001$; CFI = 0.98, RMSEA = 0.05, SRMR = 0.03. All loadings in the revised model ranged between .55 and 84 and were significant at p <.001. The resulting two-factor solution was

consistent with the original ABS-C scale: *task avoidant-behavior* (four items, α = .80, e.g., "If the task is difficult, I prefer doing something else"), and *mastery orientation* (three items, α = .75, e.g., "I can do even difficult school tasks right away"). The correlation between the two factors was -.61.

2.3 Statistical Analyses

Data analyses were conducted in several steps. First, preliminary analyses of the factor structure of the InSitu variables were carried out with the exploratory factor analyses alike in pilot study. The results showed that one question ("How much personal attention did you get from the teacher during the lesson?") did not explain a significant portion of the variance of any of the factors (communality = .025). Consequently, we excluded the item and carried out further analyses with the remaining 17 items.

Second, based on exploratory factor analysis, confirmatory factor analyses (CFAs) were conducted using the Mplus statistical package. The parameters of the models were estimated using FIML estimation with non-normality robust standard errors (MLR estimator). As the data were hierarchical in nature, a hierarchical two-level model was used. First level i.e., within level modelled variation within students (i.e., variation from lesson to lesson) and second level i.e., between level modelled variation between students. Factor loadings were fixed to be equal at both levels. The chi-square test (χ^2), the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR) were used as indices to evaluate the goodness of fit of the estimated model.

Finally, we examined the concurrent validity of InSitu Instrument by calculating correlations between the InSitu factors, student engagement, achievement beliefs, and task value measures assessed by questionnaires. Correlations were examined at the in-between level.

3. Results

3.1 The Factor Structure of the InSitu Instrument

The correlations and intra-class correlations (ICC) for the observed InSitu items are presented in Table 2. Intra-class correlations for the in-between level ranged from .26 to .46, and thus indicated variation both within students and between students. However, more than half of the variation was in the within level.

On the basis of the EFA results indicating a five factor structure, CFA was conducted. The model fit was acceptable: $\chi^2(228) = 1101.32$, $p < .001$; CFI = 0.93; RMSEA = 0.04; SRMR = 0.04 for the within level and SRMR = 0.10 for the in-between level. The standardized factor loadings of the final InSitu Instrument are presented in Table 3, and correlations between factors are shown in Table 4. The CFA solution resulted in the following five-factor structure for the InSitu Instrument (items included to each factor are presented in Table 1): 1) *behavioral engagement* (seven items), 2) *emotional engagement* (three items), 3) *competence experiences* (two items), 4) *disaffection* (three items); and 5) *help seeking* (two items). These factors explained between 12% and 64% of the variance in the items at the within level and between 40% and 98% of the variance at the in-between level, suggesting good reliability of the InSitu Instrument. Similarly, high standardized factor loading suggested the construct validity of the instrument. The results indicated that all 17 of the items included in the final five-factor model were acceptable indicators of the latent factors.

The factor analysis produced a five-factor structure for the InSitu Instrument. The factors of the CFA explained at least 40% of the variance in the items of the InSitu Instrument at the between level (between students), suggesting that all the items of the InSitu Instrument were highly reliable. Furthermore, high standardized factor loadings indicated high construct validity for the items. Thus, the results suggest that all the items included in the model (i.e., 17 items after the exclusion of one item) were good

indicators of the latent factors. The solution was also satisfactory because the factors were in line with student engagement theories. The first factor, behavioral engagement, captured active involvement, persistence, and attention during lessons (c.f., Fredricks et al., 2004; Skinner et al., 2009; Wang, Willett, & Eccles, 2011). The second factor, emotional engagement, focused on students' intrinsic motivation and positive emotions during lessons (c.f.., Skinner et al., 2009). The third factor, competence experiences (c.f., Eccles et al., 1993), included two items focusing on students' success expectations in their tasks during lessons. The fourth factor, disaffection, assessed students' negative emotions, boredom, and lack of concentration during lessons (c.f.., Skinner et al., 2009). Finally, the fifth factor, help seeking, captured questions concerning students' help seeking from peers or teachers (Marchand & Skinner, 2007).

3.2 Concurrent Validity

Next, we examined whether students' questionnaire reports of student engagement, achievement beliefs, and task values would provide evidence for the concurrent validity of the InSitu Instrument. For this purpose, we carried out a model that estimated correlations between InSitu factors and student engagement (SEI), and also correlations between InSitu factors and learning motivation (task values and achievement beliefs). The model fit was excellent: $\chi^2(834) = 2648.46$, $p < .001$; CFI = 0.95; RMSEA = 0.03; SRMR = 0.04 for the within level and SRMR = 0.05 for the in-between level. The correlations between assessments are shown in Table 5.

3.2.1 Correlations between InSitu factors and student engagement (SEI).

The results showed that students' engagement in their school work was strongly and positively associated with situation-specific engagement and motivation. More specifically, those students who found their schoolwork relevant and had high aspirations and goals for their future reported high quality teacher–student relationships and found peers and family

supportive for their learning; they also reported high emotional and behavioral engagement, high competence experiences, and low disaffection during lessons. Results for help seeking during the lesson showed that students with high future aspirations and goals and high family support for learning reported low help seeking during lessons, whereas students' high peer support was related to high help seeking during lessons. However, control and relevance of school work and quality of teacher–student relationships were not related to help seeking during the lesson.

3.2.2 Correlations between InSitu factors and task values.

The results further showed that students' task values were strongly related to their situation-specific ratings. Students who found math and literacy important, useful, and interesting as a school subject also reported high behavioral and emotional engagement, high competence experiences, and low disaffection after lessons. Help seeking was negatively related to high importance and interest in math and literacy but was related to usefulness only in the case of mathematics.

3.2.3. Correlations between InSitu factors and achievement beliefs.

Finally, the results showed that students' achievement beliefs were highly related to their situation-specific ratings. Students with task-avoidant behavior reported low behavioral and emotional engagement and competence experiences but high disaffection and help seeking during the lesson. In contrast, students' with mastery orientation reported high behavioral and emotional engagement and competence experiences but low disaffection and help seeking during lessons.

4. Discussion

The present study was conducted, first, to examine the situational (intra-individual) variation in students' classroom experiences of engagement from one lesson to another; second, to investigate the factor structure of the InSitu Instrument; and third,

to test the validity and item reliability of the instrument. The results showed a substantial amount of variation in student engagement between lessons. Furthermore, a multidimensional five-factor structure was identified for the InSitu Instrument. These factors also showed moderate or high associations with more traditional measures of engagement and motivation. The results showed that > 50% of the total variance in students' situation-specific classroom engagement was due to intra-individual variation. In the other words, student's behavioral and emotional engagement and competence experiences, disaffection, and help seeking varied from one learning situation to another as subjects, contexts, and lesson content changed. This finding has several implications. First, it shows that the InSitu Instrument captures students' real situation-specific experiences of engagement that could not be assessed with traditional questionnaires. Second, the finding emphasizes the importance of investigating situation-specific variations in engagement (e.g., Skinner et al., 2009; Eccles & Wang, 2012). Finally, this finding suggests that there is an evident need for future studies on the effects of contextual factors on students' classroom engagement. For example, the recent findings of Pöysä, Vasalampi, Lerkkanen, Poikkeus, & Nurmi (submitted for publication) have shown that time of the day does not have as large of an effect on students' situation-specific classroom engagement as lesson content does.

The factor structure of the InSitu Instrument suggests some interesting information about students' situation-specific classroom engagement. First, somewhat surprisingly, items tapping external pressure during the lesson were loaded in the behavioral engagement factor. This result suggests that students who experience external pressure in lessons also put effort in their learning tasks, for example to please their teacher or to try to act according to the teacher's wishes. The result is important because it confirms the recent results of Malmberg et al. (2015), who showed that at the

situation-level, students' extrinsic motivation is associated positively with their intrinsic motivation. These findings indicate that that students who are engaged and motivated also adapt to the extrinsic demands of a lesson (Lepper, Corpus, & Iyengar, 2005; Malmberg et al., 2015; Ratelle, Guay, Vallerand, Larose, & Senecal, 2007).

Second, the factor analyses also showed that students' disaffection was highly negatively correlated with their behavioral engagement and competence experiences at the in-between level. However, at the within level, disaffection was not correlated with students' behavioral engagement or to their competence experiences. Thus, although students who typically report competence and engagement at school also show low levels of overall disaffection, in a particular lesson their disaffection cannot be predicted by their level of behavioral engagement or competence experiences. One possible explanation for this finding is that in a particular lesson, a student is able to participate actively and feel competent despite the fact that she or he finds the lesson boring and tiring, whereas overall experiences of low competence and engagement are related to high levels of overall negative emotions.

Finally, the results of the present study showed that all the InSitu factors were highly related to students' achievement beliefs, task values, and engagement in school. That is, the students who were highly engaged in and motivated toward school and learning tasks when measured by traditional questionnaire measures also experienced high behavioral and emotional engagement, high competence experiences, and low disaffection and help seeking during different lessons. These findings indicate the high concurrent validity of the InSitu Instrument. The findings also support the idea that moment-to-moment experiences of engagement may congeal to long-term engagement trajectories (Eccles & Wang, 2012), and the process-level analyses on students' lesson-

to-lesson experiences can be used to identify the early signs of disengagement to schoolwork among students (Finn & Zimmer, 2012; Klem & Connell, 2004).

4.2 Limitations and Future Research

The present study includes some limitations. First, the factors of the current InSitu Instrument in some cases contained only two items. Second, the factor that included the most items, i.e., behavioral engagement, also included items that have been theoretically linked to cognitive engagement, such as persistence in studying and planning tasks ahead (Archambault, Janosz, Fallu, & Pegani, 2009; Wang, Willett, & Eccles, 2011). In the InSitu Instrument, the behavioral and cognitive items formed a joint factor. This result suggests that cognitive engagement is difficult to differentiate from behavioral engagement, and more research is needed to distinguish the cognitive form of engagement from the behavioral form. Third, the InSitu Instrument did not include all the components that are assumed to be indicators of classroom participation and academic involvement. For example, some assessments have defined disaffection as also including students' oppositional, disruptive, rebellious, or defiant behaviors (e.g., Finn, Pannozzo, & Voelkl, 1995; Roeser, Strobel, & Quihuis, 2002).

4.3 Practical Implementation

The present InSitu Instrument captures student participation in learning activities in the classroom, ranging from energized, focused, emotionally positive interactions with academic tasks to negative emotions. Such an instrument provides valuable information for teachers about the ways in which to support students' classroom engagement and to identify early signs of disengagement (Appleton et al., 2006; Finn & Zimmer, 2012; Klem & Connell, 2004). Such information is important when planning the schedules of school lessons, learning activities, and instruction in different subjects (Pöysä et al., submitted for publication). Moreover, the InSitu

Instrument is useful for developing classroom activities and materials that increase student engagement and motivation in class (see also Skinner et al., 2009) and in the development of interventions and for professional development programs for teachers.

4.4 Conclusion

The findings of the present study showed substantial variability in student engagement and motivation between lessons. Furthermore, the results of the study suggested that the InSitu Instrument is a usable and valid tool for investigating students' situation-specific engagement and gaining information about sources of and variations in engagement in day-to-day situations at school.

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Table 1. *Questions included in the InSitu Instrument.*

	Question
Item Beh[1]	How important did you find the studied contents?
Item Beh[2]	How much did you try to act according to the teacher's wishes?
Item Beh[3]	How much did you invest effort into making the teacher pleased with you?
Item Beh[4]	To which extent were you prepared for the lesson?
Item Beh[5]	How well did you concentrate during the lesson?
Item Beh[6]	How persistent were you in studying during the lesson?
Item Beh[7]	How much did you plan your tasks ahead instead just doing them right away?
Item Emo[1]	How much did you like this lesson?
Item Emo[2]	How pleasing did you find the studied tasks?
Item Emo[3]	How enjoyable was the lesson?
Item Comp[1]	How easy the lesson was for you?
Item Comp[2]	How well did you understand what was taught?
Item Daff[1]	How much did you do other things than the tasks at hand?
Item Daff[2]	How tired did you feel during the lesson?
Item Daff[3]	How boring was the lesson?
Item Help[1]	How much did you ask for help from the teacher/another adult during the lesson?
Item Help[2]	How much did you ask for help from your classmates during the lesson?
Item Help[3]	How much personal attention did you get from the teacher during the lesson?

Note. Response format for items was 1 = not at all to 5 = very much.

Table 2. *Correlation matrix and intra-class correlations (ICC) with p-values for manifested variables.*

InSitu items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Item Beh[1]	1.00	.32	.30	.23	.28	.27	.16	.29	.34	.24	.18	.27	.03	-.01	-.07	.06	.06
2. Item Beh[2]	.83	1.00	.42	.27	.41	.37	.19	.35	.40	.30	.32	.37	-.03	-.03	-.04	.07	.06
3. Item Beh[3]	.61	.75	1.00	.32	.34	.35	.21	.33	.33	.28	.34	.30	.04	.05	-.03	.14	.13
4. Item Beh[4]	.64	.66	.60	1.00	.32	.33	.27	.28	.32	.27	.29	.35	.08	.02	.02	.11	.14
5. Item Beh[5]	.73	.93	.64	.73	1.00	.41	.22	.38	.37	.33	.35	.44	-.05	-.01	-.07	.01	.05
6. Item Beh[6]	.79	.87	.83	.72	.87	1.00	.33	.34	.35	.34	.30	.37	-.02	.01	-.03	.10	.13
7. Item Beh[7]	.53	.54	.74	.55	.51	.65	1.00	.20	.21	.20	.13	.22	.09	.12	.06	.21	.18
8. Item Emo[1]	.83	.77	.62	.64	.69	.75	.57	1.00	.61	.44	.35	.35	.01	-.13	-.20	.13	.08
9. Item Emo[2]	.86	.81	.68	.66	.72	.81	.63	.97	1.00	.46	.38	.38	.02	-.12	-.17	.15	.09
10. Item Emo[3]	.83	.82	.64	.65	.76	.81	.85	.95	.94	1.00	.28	.30	.00	-.09	-.20	.17	.16
11. Item Comp[1]	.53	.72	.42	.48	.61	.53	.22	.56	.57	.61	1.00	.56	.10	-.01	-.04	-.03	.02
12. Item Comp[2]	.65	.82	.50	.56	.65	.65	.31	.61	.66	.65	.92	1.00	.04	.01	-.03	.01	.03
13. Item Daff[1]	-.40	-.47	-.18	-.34	-.50	-.35	.00	-.19	-.25	-.16	-.25	-.40	1.00	.24	.22	.13	.15
14. Item Daff[2]	-.38	-.38	-.21	-.22	-.42	-.35	-.08	-.36	-.31	-.34	-.16	-.30	.59	1.00	.45	.13	.18
15. Item Daff[3]	-.59	-.55	-.34	-.41	-.53	-.49	-.18	-.61	-.63	-.59	-.28	-.44	.67	.80	1.00	.16	.19
16. Item Help[1]	-.07	-.22	.07	-.00	-.22	-.00	.30	-.03	.01	.05	-.31	-.37	.63	.53	.42	1.00	.49
17. Item Help[2]	-.20	-.32	-.01	-.16	-.36	-.13	.26	-.11	-.10	-.02	-.44	-.48	.72	.52	.50	.87	1.00
ICC	0.46	0.41	0.42	0.41	0.43	0.33	0.37	0.43	0.39	0.26	0.37	0.32	0.36	0.33	0.39	0.35	0.32
p<	.001	.001	.001	.000	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001	.001

Note 1. Beh = Behavioral engagement; Emo = Emotional engagement; Comp = Competence experiences; Daff = Disaffection; Help = Help seeking.

Note 2. Correlations above the diagonal are for the within level and below the diagonal are for the between level.

Table 3. *Standardized factor loadings in the InSitu Instrument.*

	Factors									
InSitu	BEH		EMO		COMP		DAFF		HELP	
	W	B	W	B	W	B	W	B	W	B
Item Beh[1]	.51	.82								
Item Beh[2]	.63	.97								
Item Beh[3]	.56	.78								
Item Beh[4]	.52	.75								
Item Beh[5]	.62	.94								
Item Beh[6]	.60	.94								
Item Beh[7]	.35	.63								
Item Emo[1]			.76	.97						
Item Emo[2]			.76	.99						
Item Emo[3]			.64	.97						
Item Comp[1]					.69	.93				
Item Comp[2]					.80	.99				
Item Daff[1]							.37	.67		
Item Daff[2]							.62	.82		
Item Daff[3]							.70	.98		
Item Help[1]									.70	.92
Item Help[2]									.69	.96

Note. All estimates were significant ($p < .001$). W = Within level; B = Between level; BEH = Behavioral engagement; EMO = Emotional engagement; COMP = Competence experiences; DAFF = Disaffection; HELP = Help seeking.

Table 4. C*orrelations between factors in the InSitu Instrument.*

	BEH	EMO	COMP	DAFF	HELP
BEH	1.00	.79***	.74***	-.03ns.	.23***
EMO	.86***	1.00	.63***	-.28***	.24***
COMP	.79***	.66***	1.00	-.01ns.	.02ns.
DAFF	-.56***	-.57***	-.41***	1.00	.37***
HELP	-.22**	-.06ns.	-.46***	.60***	1.00

Note 1. ***$p < .001$. BEH = Behavioral engagement; EMO = Emotional engagement; COMP = Competence experiences; DAFF = Disaffection; HELP = Help seeking.

Note 2. Correlations above the diagonal are for the within level and below the diagonal are for the between level.

Table 5. *Correlations between InSitu factors and students' overall engagement and learning motivation.*

	BEH	EMO	COMP	DAFF	HELP	*M*
Student Engagement						
Control and relevance of school work	.64***	.53***	.51***	-.46***	-.10ns.	3.03
Teacher–student relationship	.40***	.38***	.27***	-.41***	-.09ns.	2.92
Future aspirations and goals	.47***	.38***	.50***	-.27***	-.19**	3.55
Peer support in learning	.24***	.26***	.20***	-.15**	.15**	3.04
Family support in learning	.40***	.28***	.40***	-.23***	-.17**	3.49
Task Values						
Importance of math	.49***	.39***	.53***	-.24***	-.20***	3.81
Usefulness of math	.48***	.39***	.44***	-.22***	-.15**	3.68
Interest in math	.50***	.50***	.48***	-.34***	-.14**	2.89
Importance of literacy	.53***	.39***	.46***	-.25***	-.13*	3.68
Usefulness of literacy	.50***	.40***	.40***	-.24***	-.09ns.	3.46
Interest in literacy	.55***	.52***	.41***	-.33***	-.11*	2.93
Achievement Beliefs						
Task avoidant behavior	-.47***	-.35***	-.33***	.44***	.24***	2.91
Mastery orientation	.57***	.49***	.55***	-.30***	-.15**	3.14

Note. *$p < .05$, **$p < .01$, ***$p <. 001$. AFF = Affective engagement; BEH = Behavioral engagement; COMP = Competence experiences; DAFF = Disaffection; HELP = Help seeking.