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Running headline: SITUATION-SPECIFIC ENGAGEMENT

## Variation in Situation-Specific Engagement among Lower Secondary School

### Students

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### Abstract

The majority of previous research has examined school engagement as an overall student characteristic. The present study contributes to the field by examining variation in students' situation-specific engagement from one lesson to another and by investigating situational determinants of such variation. An intensive one-week lesson-to-lesson data collection was conducted in four lower secondary school classrooms. Students rated their situation-specific engagement at the end of each lesson with a mobile-based InSitu instrument. Data comprising a total of 57 students and 1,328 ratings were analyzed with two-level hierarchical multivariate model (between students, and within students between lessons). The results indicated substantial within student variation in engagement between lessons which was predicted by school subjects. Students reported highest situational engagement and lowest disaffection in lessons of non-academic subjects. The findings extend prior literature by specifying factors affecting students' situation-specific engagement and by unraveling effects due to variation within and between students.

*Keywords:* situation-specific engagement; experience sampling; lower secondary school

## Variation in Situation-Specific Engagement among Lower Secondary School Students

### 1. Introduction

A considerable body of literature indicates that engagement plays a significant role in students' academic learning (e.g., Appleton, Christenson, Kim, & Reschly, 2006; Fredricks, Blumenfeld, & Paris, 2004; Skinner, Kindermann, & Furrer, 2009). Engagement predicts attendance and academic resilience, whereas lack of school engagement leads to negative consequences, such as underachievement and school drop-out (Fredricks et al., 2004). During secondary school years in early adolescence, risks for development of disengagement (Roeser, Eccles, & Sameroff, 2000) and alienation from school (Skinner & Pitzer, 2012) are particularly pronounced. The existing research on student engagement is dominated by a focus on trait-like indicators of students' general school engagement. The assessment of situation-specific classroom engagement is much more infrequent despite the widely acknowledged view of engagement as malleable and sensitive to various changing factors in the environment (Fredricks et al., 2004). Thus, only little is known about the variation in student engagement over short time periods during the school week (Eccles & Wang, 2012). Analysis of engagement in lesson-to-lesson learning experiences has been called for to gain deeper understanding of the dynamics and the key factors within the classroom that foster or impede engagement and learning motivation (Appleton et al., 2006; Finn & Zimmer, 2013). Consequently, the purpose of the present study was to examine variation in students' situation-specific engagement during a school week by collecting lesson-to-lesson ratings and paying attention to both the subject being studied and time of a day.

## 1.1 Student Engagement

Engagement has been described as students' involvement and commitment with school in ways that promote their learning (Fredricks et al., 2004; Skinner et al., 2009; Wang, Willett, & Eccles, 2011). In the tripartite approach to engagement, *behavioral engagement* refers to students' participation and involvement with learning and academic tasks, students' positive conduct, and participation in extra-curricular school-related activities (Fredricks et al., 2004; Skinner et al., 2009). *Cognitive engagement*, in turn, captures students' cognitive investment in learning (Archambault, Janosz, Fallu, & Pagani, 2009; Fredricks et al., 2004) including valuing of school and academic attainment (Connell & Wellborn, 1991), orientation towards mastery of knowledge and skills (Newmann, Wehlage, & Lamborn, 1993), and use of metacognitive strategies (Zimmerman, 1990). Finally, *emotional* (or affective) *engagement* comprises students' sentiments toward school and learning and their sense of belonging with other students, teachers and school (e.g., Finn 1989; Fredricks et al., 2004; Skinner et al., 2009).

Parallels can be found between different components of engagement, and the concepts capturing aspects of students' learning motivation (see e.g., Fredricks et al., 2004; Skinner et al., 2009). These concepts include for example, task-focused behavior (Onatsu-Arvilommi & Nurmi, 2000) and flow (Csikszentmihalyi, 1990) aligning with behavioral engagement, i.e., persistence, attention and participation in academic behaviors. Concepts such as intrinsic motivation (Deci & Ryan, 1985; Larson & Rusk, 2011; Ryan & Deci, 2000), mastery-goal orientation (Dweck, 1986), task-value (Eccles et al., 1983), and self-regulation (Wolters & Taylor, 2012) and self-regulated learning (e.g., Boekaerts, Pintrich, & Zeidner, 2000) are similar or overlapping concepts with cognitive engagement construed as preference for and investment in challenging academic learning. Finally, anticipatory and achievement emotions (Pekrun, 2009) share similarities with the concept of emotional engagement. The

particular value of the multifaceted construct of engagement lies in the comprehensive nature through which it captures students' actual behaviors, thinking, and feelings in learning situations and in the school context (e.g., Skinner, 2016). Thus, engagement is crucially involved with the entity of learning at school, and can optimally capture its multiple antecedents and consequences simultaneously and dynamically (see Fredricks et al, 2004), and inform on ways of supporting students' learning.

The conceptualization of student engagement contains the presumption that engagement is malleable, thus, responsive to variations within learning contexts and situations (e.g., Appleton et al., 2008; Fredricks et al., 2004; Fredricks & McColskey, 2012). The studies in the field, however, have mostly been based on measuring students' engagement as a trait-like construct at single points of time and by aggregating information from different situations (Eccles & Wang, 2012; Fredricks et al., 2004). Although these studies have provided valuable insights into the overall nature of engagement, they do not provide understanding of variation of engagement in different learning settings, tasks, and conditions (Fredricks & McColskey, 2012). In order to understand how the characteristics of learning situations at school impact student engagement and how it can be supported in authentic learning situations, studies focusing on situational variation of student engagement are needed.

## **1.2 Situational Engagement**

The existing literature suggests that students' engagement is formed in transaction with the context in which they study and learn (Eccles & Wang, 2012). Thus, engagement should not solely be examined as a general tendency or an individual characteristic, but as a constantly fluctuating state sensitive to situational factors (Appleton et al., 2008; Fredricks et al., 2004; Skinner et al., 2009). Thus far, only a limited number of studies have investigated situational variation in student engagement. In a recent study by Martin et al. (2015),

secondary school students were asked to complete a short form of the Motivation and Engagement Scale three times in the school day (before lunch, before the last lesson, and during evening homework) over a four-week period. The results showed significant intra-individual variation (23% of the total variation) in students' motivation and engagement between different measurement points. We documented in our previous study (Vasalampi et al., 2016) that although inter-individual variation in situational engagement of lower secondary school students' was significantly associated with their overall engagement, there was also substantial intra-individual variation (50% of the total) in engagement between lessons. Unfortunately, these studies did not provide information on situational factors contributing to this variation.

Skinner et al. (2009) have suggested that interaction between students and various situational factors, i.e., school subjects, assignments, and time, is likely to have an impact on students' experiences and their engagement in the classroom (see also, Eccles & Wang, 2012; Fredricks et al., 2004). For example, feedback that students receive of their success in managing learning tasks in a particular subject, such as mathematics, has consequences for their self-concept, interest and engagement in that subject (cf. Eccles et al., 1983). However, empirical evidence on contribution of situational factors to engagement is scarce. As an exception, Shernoff, Csikszentmihalyi, Schneider, and Shernoff (2003) studied situational engagement by utilizing an experience sampling method to ask students to rate their experiences of concentration, interest, and enjoyment on a given moment. They found that students reported higher engagement in lessons of non-academic subjects, including arts and computer science, than in academic subjects, such as math and history. These findings are, however, limited in breadth of measures as only one item was used to assess each dimension.

Although some studies have proposed, that time has an impact on situational engagement (Appleton et al., 2006; Skinner et al., 2009), empirical evidence tapping this

issue is still limited. There are some studies showing, for example, that students achieve higher scores from lessons scheduled for late morning compared to other times of day (Cortes, Bricker, & Rohlfs, 2009; Klein, 2007), and that students report the lowest positive affect as well as the highest negative affect, and highest experience of challenges on Mondays (Tolvanen et al., 2011). The recent study by Martin et al. (2015), however, did not find any time-related variation in situational engagement. Thus, while the findings in the literature are somewhat inconsistent they suggest that also time of the lesson is a factor which needs to be taken into consideration in studies of situational engagement.

### **1.3 Engagement in relation to students' characteristics**

Prior literature has shown that students' engagement may be shaped by students' characteristics such as gender and achievement level (e.g., Skinner et al., 2009; Wang & Decol, 2014). Higher behavioral, emotional, and cognitive engagement with school and learning has repeatedly been documented for girls than for boys (Lam, Jimerson et al., 2012; Lam et al., 2016; Marks, 2000). In light of previous literature, this gender difference could be due to higher persistence of girls when facing challenges (Martin, 2004), their higher willingness to adapt to school norms and set mastery goals (Eccles & Roeser, 2011; Martin, 2004), their higher sense of relatedness (Furrer & Skinner, 2003), and attitudes making it more socially acceptable for secondary school girls to work hard in school (Warrington, Younger, & Williams, 2000) as compared to boys.

Level of student engagement has also been documented to be associated with students' academic achievement and motivation (see Fredricks et al., 2004). Academically successful middle and high school students have been found to report greater engagement with school than students with low academic success (Virtanen, Lerkkanen, Poikkeus, & Kuorelahti, 2014; Wang & Fredricks, 2014). This finding is similar to those showing that academic achievement predicts subsequent task-focused behavior (Onatsu-Arvilommi &



Nurmi, 2000) and interest in academic subjects (e.g., Viljaranta, Tolvanen, Aunola, & Nurmi, 2014). Taken together, the prior evidence, thus, suggests that successful learning experiences and academic achievement are important for evolving engagement.

#### **1.4 The Present Study**

The present study investigated situational variation in student engagement by using lesson-to-lesson ratings from an intensive one-week data collection among 7<sup>th</sup> graders. The aim was to determine the extent to which student engagement varies between students and within students between lessons. Variation in engagement between students was predicted by students' academic achievement (Wang & Fredricks, 2014), whereas the variation between lessons was predicted by school subject (Shernoff et al., 2003; Marks, 2000) and time of the lesson within the school day (Csikszentmihalyi & Hunter, 2003). Based on prior literature, we controlled for gender (Lam, Jimerson et al., 2012) and day of the week (Tolvanen et al., 2011). We expected to find between-student (inter-individual) variation in students' engagement (Martin et al., 2015; Vasalampi et al., 2016), as well as within student (intra-individual) variation between lessons (i.e., from one lesson to another). We assumed that students' high engagement would be associated with high academic achievement (Virtanen et al., 2014). In turn, lesson-to-lesson variation was expected to be associated with school subject being studied (Shernoff et al., 2003; Marks, 2000) and time of the day (Csikszentmihalyi & Hunter, 2003).

## **2. Method**

### **2.1 Participants and Procedure**

The present study was part of an extensive longitudinal age cohort study (First steps study; Lerkkanen et al., 2006–2017), comprising 1,879 students, along with their parents and teachers, which investigates children's academic and motivational development from the pre-primary to the ninth grade, and the effects of school and home environments on child

outcomes. The sample for the larger longitudinal study was recruited from four municipalities in Finland: two in Central, one in Western, and one in Eastern Finland. The guardians gave their written consent for their children's participation in the study.

### **2.1.1 The sample of present study**

The sample of the present study, participants of a one-week intensive lesson-to-lesson follow-up from Grade 7, comprised 57 students (24 girls and 33 boys). The students invited to participate to this study came from four classes from two lower secondary schools (School 1: three classes; School 2: one class). School 1 was a medium-sized school with a student body of approximately 400 located in Central Finland. School 2 was a school of similar size located in Western Finland. From School 1, the participants comprised a total of 46 students from three classes (Class A: 15 participants out of 18 students; Class B: 15 participants out of 16 students; Class C: 16 participants out of 19 students), and from School 2, a total of 11 out of 24 students from one class (Class D). The percentage of students with parental consent for participation in the assessments of the longitudinal age cohort study was on average 74.0% in the four classes. All students with parental consent from the four classes participated in the ratings of situational engagement during one-week intensive data collection. The students' average age was 13.12 years ( $SD = 0.26$ ) at the beginning of Grade 7. The participants attended general education in mainstream schools and all students were Finnish-speaking.

Classes that provided data for the present study were selected from the longitudinal follow-up based on two criteria. Priority was given to classes in which: (1) a high percentage of the students were participants of the longitudinal follow-up; and (2) a high percentage of the subject teachers teaching this class were willing to enable the intensive data collection. The subsample of the present study was highly representative of the participants of the longitudinal study with respect to general engagement assessed using the short version (Vasalampi et al., 2016) of the Student Engagement Instrument (SEI, Appleton et al., 2006).

In four out of five factors of the SEI (control and relevance of school work, teacher-student relationship, future aspirations and goals, and peer support in learning), no statistical differences were found between the larger sample and the subsample of this study. The only difference between the present subsample and the main sample emerged for students' experience of family support in learning, where students in the present subsample gave lower ratings ( $t(1731) = -2.45, p < .05$ ). With respect to mothers' educational level, the subsample was representative of the main sample of the longitudinal study. In the present subsample, a total of 7.3% of the mothers had a low educational level, 73.2% had a medium educational level, and 19.5% had a high educational level. Furthermore, no statistical differences were found in the teachers' educational levels or work experience between those teachers who participated in the present data collection ( $N = 34$ ) and other teachers ( $N = 252$ ) involved in the longitudinal study.

Each attending class participated in an intensive one-week follow-up in spring 2014. In School 1, the students were asked to rate their situation-specific engagement at the end of each of the 30 lessons of the week. In School 2, some of the teachers did not agree to allow student ratings of situational engagement in their lessons; thus, students were requested to rate a maximum of 23 lessons.

Student ratings of situational engagement were carried out using a mobile application which was pre-programmed into smart phones. The phones were handed out simultaneously to the students at the end of the lessons and collected from them a few minutes later, once they had completed a short questionnaire (see a similar procedure by Malmberg & Hagger, 2009). The ratings available for each student varied depending on the students' attendance at school during that week. In Class A, the students rated their situation-specific experiences an average of 24.1 times ( $SD = 3.1$ , range 17–28); in Class B, an average of 25.9 times ( $SD = 4.26$ , range 19–30); in Class C, an average of 24.0 times ( $SD = 6.7$ , range 8–30); and in Class

D, an average of 17.7 times ( $SD = 5.2$ , range 5–23). With a total response rate of 81.8%, the data for the present study contained a total of 1,328 time-stamped ratings of students' situation-specific experiences.

### **2.1.2 Education in Finland**

In Finland, the nine-year compulsory comprehensive education begins in the year when the child turns 7 years of age. During lower secondary school (Grades 7, 8, and 9), students are taught by subject teachers who have master's degrees in the subject they teach and have completed pedagogical studies. The vast majority of schools are free-of-charge public schools which follow the national core curriculum, and most often students attend school nearest to their home (OECD, 2012).

At the beginning of the seventh grade, students are assigned into home groups (i.e., classes), with 17 students, on average, in each group. Most of the time, the same set of students study together and move from the classroom of one subject teacher to another, according to their daily timetables. However, in some cases, classes are divided into different and/or slightly smaller groups, especially for subjects that include practical work, such as physics, chemistry, and home economics.

In lower secondary school, students have approximately 30 lessons per week. School days begin between 8 a.m. and 10 a.m. and end between 2 p.m. and 4 p.m. Days comprise up to seven lessons, and each lesson is followed by a short recess. The most typical length of a lesson is 45 minutes, but it is possible to have 75- or 90-minute lessons as well, after which there is a 15-minute break. Times of the day when different subjects are taught for each class are not standard but vary randomly; math lessons can be the first one in the morning on some days and the last in the afternoon on some other day of the week.

## 2.2 Measures

### 2.2.1 Situation-specific engagement

Students' self-rated situation-specific engagement was measured at the end of the lessons using the mobile-based InSituations (InSitu) instrument (Lerikkanen, Vasalampi, & Nurmi, 2012; Vasalampi, 2016) developed within the longitudinal First steps study (Lerikkanen, 2006–2017). Items comprising the InSitu instrument were based on earlier studies and measures concerning students' situational engagement and motivation (e.g., Malmberg & Hagger, 2009; Martin et al., 2015; Reeve, 2012; Skinner et al., 2009) and adapted for the current context. InSitu consists of 17 items (Table 1) rated on a 5-point scale (1 = not at all; 5 = very much). The measure has been piloted prior to this study.

The psychometric structure of the InSitu instrument was established using confirmatory factor analysis (CFA). As InSitu is a relatively new measure, the factor analyses were conducted with two different sets of data, first with the present intensive one-week lesson-to-lesson data (collected in classes A, B, C, and D;  $N = 57$ ; 1,328 time-stamped ratings), and, second with the larger set of data ( $N = 3,457$  time-stamped ratings) of the longitudinal age cohort study. This larger set of data was collected in spring 2014 as part of the longitudinal XX study (a total of 288 lessons from a total of 30 schools) by asking Grade 7 students ( $N = 884$ ) to rate their situation-specific experiences at the end of two to four video-recorded lessons (for more details, see Vasalampi et al., 2016).

CFA analyses indicated a five-factor structure for the InSitu: 1) behavioral and cognitive engagement (7 items,  $\alpha = .83$ ); 2) emotional engagement (3 items,  $\alpha = .85$ ); 3) disaffection (3 items,  $\alpha = .68$ ); 4) competence experiences (2 items,  $\alpha = .81$ ); and 5) help-seeking (2 items,  $\alpha = .76$ ). The model fit for the five-factor CFA was acceptable:  $\chi^2(109) = 1390.90$ ,  $p < .001$ ; CFI = .932; RMSEA = .058; SRMR = .051. In line with the tripartite approach to engagement (e.g., Fredricks et al., 2004) consisting of behavioral, cognitive and

emotional components of engagement only the first three latent factors of the InSitu instrument were used in the current study, and the two remaining factors (situational competence experiences, and help-seeking) were excluded from the present analyses. The first latent factor termed as *behavioral and cognitive engagement* (items presented in Table 1) was originally intended to measure behavioral and cognitive engagement as two separate factors, but the results of the factor analysis strongly suggested that the items comprise one latent factor. From a theoretical perspective, this was unfortunate but not unprecedented, as aspects such as effort has been viewed as an indicator of behavioral as well as cognitive engagement (Fredricks et al., 2004). The second latent factor, *emotional engagement*, assesses the students' positive feelings in the lesson (Table 1). The third latent factor assesses *disaffection* in line with the conceptualization by Skinner et al. (2009) where engagement is manifested through behaviors and emotions that reflect maladaptive motivational states such as lack of attention, enthusiasm and positive affect (Table 1). The factor loadings from the larger set of data, a total of 3,457 ratings were used to calculate the factor scores (sum scores) for the analyses of the present study.

### **2.2.2 Situational variables**

The *subject being studied* refers to the school subjects of the lessons from which mobile ratings were collected. Mobile ratings were available for the following 15 subjects: mother tongue and literature (i.e., Finnish as the mother tongue), mathematics, English, Swedish, biology, geography, physics, history, health education, religion, home economics, visual arts, music, physical education, and crafts. However, ratings from religion, music, and geography were later excluded because ratings for these subjects were only available from one subject teacher for each of these subjects.

When conducting statistical analyses, some of the subjects were merged to form larger units of subject areas. The following subjects and subject areas were used in the

analyses: mother tongue and literature (Finnish), mathematics, English, Swedish (which is the second national language in Finland), science (physics and biology combined), humanities (history and health education combined), home economics, arts and crafts (visual arts and crafts combined), and physical education. This categorization into larger units of subjects for the analyses was based on combining subjects that share similarities, for instance, with respect to disciplinary orientation (e.g., physics and biology as experimental sciences) or instructional practices (e.g., history and health education as subjects utilizing inquiry learning and group work). In the case of the two languages, English and Swedish, a decision was made to analyze the subjects separately, because these languages have a different status in Finland (Swedish is the other official language). Some of the subjects (i.e., Finnish as mother tongue, mathematics, home economics and physical education) were seen to represent unique content areas (cf., Finnish National Board of Education, 2016) and combining these into larger units was not considered relevant.

*The day of the week* consisted of a nominal 5-point scale (1 = Monday; 5 = Friday). The *time of day* (collected routinely as part of the mobile application of InSitu ratings) was grouped into the following three categories: 8 a.m.–10 a.m., 10 a.m.–1 p.m., and 1 p.m.–3:30 p.m.

### **2.2.3 Individual student factors**

Variables representing students' individual factors consisted of *gender* (1 = girl; 2 = boy) and level of *academic achievement*. The measure of academic achievement was based on the grade point average derived from the school registers of the students' school year report from Grade 7.

## **2.3 Analytical Strategy**

Because the data were hierarchical in nature (lessons nested within students), two-level hierarchical multivariate model between students ( $N = 57$ ), and within students between

lessons ( $N = 1,328$  ratings) was generated with the latent factors of engagement (i.e., behavioral/cognitive engagement, emotional engagement and disaffection) as dependent variables. Variation between days were analyzed as fixed effects entering days as dummy variables to the multivariate model (i.e., the effects were controlled for).

Several predictors were also entered into the multivariate model. At the *between-students* level, we tested the extent to which students' academic achievement predicted variation in engagement (i.e., behavioral/cognitive engagement, emotional engagement and disaffection) when student gender was controlled for. At the *within-students between-lessons* level, we used two procedures to test the effects of the subject being studied and the time of day (both dummy-coded) on engagement (behavioral/cognitive engagement, emotional engagement, and disaffection). First, by utilizing two-level hierarchical modeling with MLR estimator we calculated beta values for each dummy-coded school subject and the time of the day, as well as the total percentage of explained variance of school subjects at within level. Second, we conducted paired comparisons between school subjects. The possible effects of individual teachers were controlled at the within-student level by using teacher ID as a clustering variable.

Analyses were conducted with the robust maximum likelihood (MLR) as estimator using the Mplus statistical package (version 7.3; Muthén & Muthén, 1998–2012). Because some students were absent from a lesson or a full day, the data included some missing observations. The Mplus statistical package is able to correct distortions caused by incomplete data given that missingness is random (Hox, 2010). Since Little's MCAR test suggested that missingness was completely random ( $\chi^2(57) = 47.668, p = .806$ ), the standard missing at random (MAR) approach was applied. Consequently, the parameters of the models were estimated using full information maximum likelihood (FIML) estimation.



### 3. Results

#### 3.1 Correlations and Intra-class Correlations for Situation-specific Engagement

As a preliminary stage of the analyses, we investigated variation in students' behavioral/cognitive engagement, emotional engagement, and disaffection between students, between days within week, and between lessons within day by using intra-class correlations (ICC). As presented in Table 2, high intra-class correlations were found for between lessons, moderate for between students, and small for between days within week. Thus, these results showed that students' behavioral/cognitive engagement, emotional engagement, and disaffection varied most strongly between lessons and somewhat between students.

Correlations between the three latent factors of situational engagement (i.e., dependent variables) were also calculated (Table 3). Behavioral/cognitive engagement and emotional engagement were strongly associated at the between-students level and moderately associated at the within-students between-lessons level. Disaffection had low correlations with behavioral/cognitive engagement and none with emotional engagement at both levels. Interestingly, these results suggest that student ratings of their behavioral/cognitive engagement, as assessed with the InSitu instrument, were positively related to their ratings of emotional engagement, whereas disengagement seemed to be unrelated to the other two latent factors.

#### 3.2 Variation in Engagement and Academic Achievement (Between-students Level)

Next, we conducted a two-level hierarchical multivariate model in which variation in behavioral/cognitive engagement, emotional engagement, and disaffection at between-students level was predicted by students' academic achievement, and variation within students between lessons was predicted by the subject being studied and time of the lesson within day. The impact of days of week was controlled for by entering them as dummy coded variables (fixed effects) into the multivariate model. The decision for constructing a two-level

hierarchical model (with days included as dummy coded variables) instead of a three-level model (with days as an independent level) was based on small ICCs found between days of week and the study design which involved only one week of measurement for each participant (i.e., each day of week is represented only once for each participant). The multivariate two-level model was saturated. Total explained variances for this multivariate model were 8.9% for the behavioral/cognitive engagement, 12.3% for emotional engagement, and 13.3% for disaffection.

The results at the between-students level showed that students' academic achievement did not predict their ratings of behavioral/cognitive engagement or emotional engagement (after student gender was controlled for). However, students' academic achievement was statistically significantly related to disaffection ( $\beta = -.304$ ,  $p = .000$ ): students with higher academic achievement reported disaffection to a lesser extent than did students with lower academic achievement. Explained variances for between-students level were 3.4% for behavioral/cognitive engagement, 1.0% for emotional engagement, and 26.7% for disaffection.

### **3.3 Variation in Engagement by School Subject and Time of Day (Within-students Between-lessons Level)**

At within-students between-lessons level we tested the extent to which behavioral/cognitive engagement, emotional engagement, and disaffection were associated with the subjects being studied and time of the day (when day of week was controlled for). The explained variances for this level were 10.9% for behavioral/cognitive engagement, 14.7% for emotional engagement, and 9.1% for disaffection.

Variation in engagement with respect to particular school subjects was tested using paired comparison analyses which involved a set of contrasts which examined whether a particular school subject compared to another subject predicted variation in the three latent

factors of engagement, (i.e., behavioral/cognitive engagement, emotional engagement, and disaffection<sup>1</sup>). The results of the paired comparisons (see Table 4) showed that two non-academic subjects – home economics and physical education – differed from academic subjects with respect to students' situational engagement. Students rated their behavioral/cognitive engagement and emotional engagement higher and disaffection lower when attending home economics lessons or physical education lessons than when attending lessons of academic subjects. Paired comparisons showed further that students rated their behavioral/cognitive engagement lower in mathematics when compared to lessons of English and science (Table 4). The results, thus, suggested that mathematics was the subject with lowest student ratings of situational engagement. The amount of variance explained by the school subjects was 7.6% for behavioral/cognitive engagement, 11.2% for emotional engagement, and 2.8% for disaffection.

To gain understanding of variation in engagement in those school subjects which in the previous analyses had been combined into larger subject areas, additional pairwise comparisons were conducted. These paired comparisons showed higher ratings of behavioral/cognitive engagement for physics lessons when compared to mathematics ( $\beta = -$

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<sup>1</sup> The estimates of paired comparisons were calculated on the basis of beta values for the dummy coded school subjects. The estimates presented in Table 4 resemble d-value of the paired comparison; in this case, between the two respective school subjects in question. The value of the estimate can be interpreted as effect size d (out of total variation at within-student between-lessons level) of the difference that the pairwise comparisons have on the three factors of engagement (i.e., dependent variables).

.304,  $p < .05$ ), whereas similar results were not found for biology. This suggests that results concerning science were mostly due to physics.

At the within-students between-lessons level, we also analyzed associations between situation-specific engagement and the time of day. The results did not indicate significant effects for the time of day on students' situation-specific engagement when the effects of the teacher, the subject being studied, and day of the week had been taken into account.

#### **4. Discussion**

The majority of prior research in the field has focused on student engagement as a general attitude to learning or an overall sentiment towards school (e.g., Fredricks & McColskey, 2012). An emerging trend in the field of engagement during the past years is an interest in malleability and sensitivity to situational effects as a critical feature of student engagement (Fredricks et al., 2004; Fredricks & McColskey, 2012). Empirical research on the situational factors affecting fluctuation of engagement is, however, still rare. The aim of the present study was to examine the extent to which students' engagement varies between students (inter-individual variation) and from one lesson to another (intra-individual variation). Variation in engagement between students was predicted by their academic achievement and variation within students and between lessons was predicted by subject being studied and time of day. The findings of the study provide new understanding of situational variation in student engagement by showing that the largest proportion of variation in engagement was found within students between lessons, and that this variation was related to the school subjects being studied. There was also a substantial variation between students' situational engagement which, in particular for disaffection, was associated with the students' academic performance. Overall, our findings suggest that, in addition to inter-individual differences in student engagement, it is particularly important to take into account the intra-individual, situation-specific variation from one lesson to another.

One key finding of the study was that students' self-reports of engagement differed between school subjects. Overall, students reported highest situational engagement and lowest disaffection in lessons of non-academic subjects. For example, they were likely to report higher behavioral/cognitive engagement, emotional engagement, and lower disaffection in physical education and home economics lessons in comparison to lessons of other subject areas. Moreover, they were likely to report lower behavioral/cognitive engagement in mathematics lessons than in many other subjects/subject areas (in addition to home economics, and physical education also in comparison to English, science, and arts and crafts). Our results corroborate recent findings in the literature by indicating that that engagement varies within students over short periods of time (Martin et al., 2015; Vasalampi et al., 2016).

Several possible explanations may account for variation in situation-specific engagement by school subjects. First, non-academic subjects may be likely to engage students more, because they are less demanding in terms of effort and work load, whereas academic subjects may lead to lower engagement because of high demands for exertion and a higher likelihood of negative feedback in the case of failure. Our results, particularly those concerning physical education and home economics, corroborated prior findings by Shernoff et al. (2003) who documented that students reported higher situational concentration, interest, and enjoyment in non-academic subjects compared to academic subjects.

Second, lower student ratings of behavioral and cognitive engagement in mathematics lessons may be related to instructional practices typical for this particular subject. Mathematics instruction often consists of teacher-led recital and tasks, predominantly focusing on tasks requiring abstract thinking and conceptual learning, rather than on learning by exploring or accommodating tasks to take student perspectives into account. This type of

instruction runs a high risk for impeding students' engagement in the lessons (cf., Hafen et al., 2012; Lam, Wong, Yang, & Liu, 2012).

Finally, higher behavioral/cognitive and emotional engagement, as well as lower disaffection, were reported in lessons of subjects which emphasize learning by doing (e.g., home economics) or learning through exploring and experimenting (e.g., physics). In earlier literature such learning methods have been associated with higher overall engagement (e.g., Fredricks et al., 2004; Lam, Wong et al., 2012; Newmann et al., 1992; Taraban, Box, Pollard, & Bowen, 2007). The present findings, thus, suggest in line with earlier literature that learning situations in the school that allow and reinforce active participation and effort are likely to increase students' intrinsic motivation and engagement in the classroom context (cf., Ryan & Deci, 2000).

Contrary to our expectations, the time of the day did not explain variation in students' situation-specific engagement. In this respect, our findings were in line with those of Martin et al. (2015). Similarly to conclusions by Martin et al. (2015), our findings suggest that it is not the time of the lesson that matters but rather what the particular lesson demands and affords for the students.

Based on prior literature (e.g., Virtanen et al., 2014), we expected that higher academic achievement would be associated with higher student-reported situation-specific engagement. Our findings indicated that after controlling for students' gender, their academic achievement did not predict their level of behavioral/cognitive or emotional engagement in the lessons. However, achievement was related to the students' level of disaffection. Students with lower academic achievement tended to experience more negative emotions and were less likely to focus on the ongoing tasks and instruction in comparison to students with higher achievement. This higher occurrence of behaviors and emotions relating to maladaptive motivational state among students with lower achievement is in line with notions arguing that

lower achievement is reciprocally associated with higher task avoidant behavior (cf. Onatsu-Arvilommi & Nurmi, 2000).

The present findings are informative also with respect to the ongoing debate on measurement of student engagement (see more e.g., Azevedo, 2015; Fredricks & McColskey, 2012; Sinatra, Heddy, & Lombardi, 2015). Sinatra et al. (2015) urge researchers to position themselves with respect to level of measuring student engagement that they represent on the continuum ranging from person-oriented to person-in-context and context-oriented perspectives. In the present study engagement was approached from the person-in-context perspective, as our focal interest centered on the situational variation of engagement and the specific individual and situational factors that predict that variation (cf., Sinatra et al., 2015). Our findings indicated that the largest proportion of variation in behavioral/cognitive and emotional engagement, and disaffection was found between lessons, whereas inter-individual differences capture a smaller part of variation of engagement of lower secondary school students' experiences. As engagement can be assumed to evolve based on the feedback received in everyday learning, the use of measures sensitive to situational variation can be assumed to be critical in any effort to understand how long-term attitudinal stances towards school develop in transactional processes between the student and their environment. With the current data, we were able to model different aspects of situational engagement, including behavioral and cognitive engagement, emotional engagement, and disaffection. Along with some earlier studies (e.g., Martin et al., 2015), our findings suggests that an understanding of malleability of engagement can be increased by focusing on engagement in situ.

#### **4.1 Limitations**

This study involves some limitations. Firstly, the InSitu instrument, which was developed for the purpose of assessing situation-specific engagement in classrooms, has not yet been widely used in previous research. For the most part, the instrument was found to

reliably capture the intended dimensions, but it did not distinguish between cognitive and behavioral engagement (see more Vasalampi et al., 2016). Secondly, the situational and individual factors that were selected for this study represent only a small number of potentially relevant factors present in the learning environments of school. For example, in the future it would be useful to complement the assessment of situation-specific engagement with observational data on the quality of teaching to allow analysis of the role of instructional practices on student engagement. Thirdly, the results of the present study are based on students' self-ratings. In future research, data with other person-in-context measures (e.g., situational data collected from teachers' ratings of students' engagement and classroom observations) would be needed (cf., Sinatra et al., 2015). Finally, it is important to note that the present study was carried out in a Finnish school context, which differs from some other educational and cultural contexts. For example, in Finland, the differences between schools in terms of student achievement and teacher qualifications are typically relatively small, and class sizes are somewhat smaller than those in many other OECD countries (OECD, 2012).

## **4.2 Conclusions**

The present study moved beyond general engagement to explore students' situation-specific engagement during a one-week intensive follow-up in authentic classroom contexts. Our findings confirmed that there is significant variation in students' behavioral/ cognitive and emotional engagement, and disaffection across different lessons during a day, and that this variation could partly be explained by the subject of the lesson. Furthermore, the findings imply, first, that active support for engagement is needed especially for lower achieving students, and, second, that engagement should be supported particularly in academic subjects which do not lend themselves as easily to exploration and learning by doing.

The understanding gained from students' situation-specific experiences of engagement can lead to several implications. First, it can provide knowledge for teachers



concerning factors that contribute to engagement in classroom environment, and by doing so may help to find optimal ways of fostering engagement and individualized support in the lessons. Second, the results of this study, and future investigations on situation-specific engagement, provide insight into the malleability of engagement and factors that are important in processes of evolving engagement. Such knowledge would be important for developing in-service interventions, e.g., those supporting engagement by focusing on promotion of students' active participation or improving instructional methods. Prior studies on interventions of dialogic teaching, for instance, have also shown that intentional effort and support are needed for both teachers' reflection of their practices and for engaging students in educational dialogue (e.g., Lehesvuori, Viiri & Rasku-Puttonen, 2011). By collecting and utilizing situation-specific information in classroom settings teachers receive valuable evidence from students' responses to instruction. Thus, tools such as InSitu that move beyond general engagement to explore students' situation-specific engagement will be helpful in both initial and in-service teacher training for promoting engaging modes of teaching and in designing models for preventing students' disengagement from learning and participation in school.

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Table 1. *Items of the InSitu Instrument.*

1. Behavioral and cognitive engagement (7 items)
Beh/Cogn 1. How important did you find the studied contents?
Beh/Cogn 2. How much did you try to act according to the teacher's wishes?
Beh/Cogn 3. How much did you invest effort into making the teacher pleased with you?
Beh/Cogn 4. To which extent were you prepared for the lesson?
Beh/Cogn 5. How well did you concentrate during the lesson?
Beh/Cogn 6. How persistent were you in studying during the lesson?
Beh/Cogn 7. How much did you plan your tasks ahead instead just doing them right away?
2. Emotional engagement (3 items)
Emo1. How much did you like this lesson?
Emo 2. How pleasing did you find the studied tasks?
Emo 3. How enjoyable was the lesson?
3. Disaffection (3 items)
Daff 1. How much did you do other things than the ongoing tasks and instruction?
Daff 2. How tired did you feel during the lesson?
Daff 3. How boring was the lesson?
4. Competence experiences (2 items)*
Comp 1. How easy was the lesson for you?
Comp 2. How well did you understand what was taught?
5. Help-seeking (2 items)*
Help 1. How much did you ask for help from the teacher/another adult during the lesson?
Help 2. How much did you ask for help from your classmates during the lesson?

*Note.* Rated using a 5-point scale: 1 = not at all to 5 = very much. \* not included in current analyses

Table 2.

*Intra-class correlations within the day, between the days, and between the individuals.*

	Behavioral and		
	cognitive	Emotional	
	engagement	engagement	Disaffection
ICC <sub>within</sub> day	.634 ***	.706 ***	.531 ***
ICC <sub>between</sub> days	.072 *	.075 **	.077 **
ICC <sub>between</sub> individuals	.294 ***	.219 ***	.392 ***

\*\*\*  $p < .001$ , \*\*  $p < .01$ , \*  $p < .05$

Table 3.

*Within-level (below the diagonal) and between-level (above the diagonal) correlations between the three components of student engagement*

	Behavioral and cognitive engagement	Emotional engagement	Disaffection
Behavioral and cognitive engagement	-	.236 **	-.163 *
Emotional engagement	.542 ***	-	-.155 *
Disaffection	-.136 **	-.237 ***	-

\* p<.05. \*\* p<.01. \*\*\* p<.001

Table 4.  
Paired comparison analyses between the school subjects in student ratings of engagement.

		2 Mathematics	3 English	4 Swedish	5 Science	6 Humanities	7 Home economics	8 Arts and crafts	9 Physical education
1. Finnish (mother tongue)	Behavioral/Cognitive				-.197 †		-.470 ***		-.498 **
	Emotional						-.586 ***		-.770 ***
	Disaffection	-.159 †					.197 *		.359 *
2. Mathematics	Behavioral/Cognitive		-.228 *		-.272 *		-.546 ***		-.574 **
	Emotional		-.203 †		-.213 †		-.690 ***	-.220 *	-.875 ***
	Disaffection						.356 **		.518 ***
3. English	Behavioral/Cognitive						-.317 **		-.345 *
	Emotional						-.487 ***		-.672 ***
	Disaffection						.220 †		.382 **
4. Swedish	Behavioral/Cognitive						-.502 ***		-.530 **
	Emotional						-.726 ***	-.256 *	-.911 ***
	Disaffection						.269 **		.431 **
5. Science	Behavioral/Cognitive						-.274 **		
	Emotional						-.476 ***		-.661 **
	Disaffection						.183 †		.345 *
6. Humanities	Behavioral/Cognitive						-.372 **		-.400 *
	Emotional						-.500 ***		-.685 ***
	Disaffection						.230 *		.393 *
7. Home economics	Behavioral/Cognitive								
	Emotional								
	Disaffection								
8. Arts and crafts	Behavioral/Cognitive						-.350 ***		-.378 *
	Emotional						-.470 ***		-.655 ***
	Disaffection						.263 **		.426 **
9. Physical education	Behavioral/Cognitive								
	Emotional								
	Disaffection								

Note. The subject or subject areas on the horizontal axis are compared to the subjects on the vertical axis. Subject areas: science (physics and biology combined), humanities (history and health education combined), arts and crafts (visual arts and crafts combined). Negative numbers suggest lower situational ratings for a subject on the horizontal axis when compared to a subject on the vertical axis (e.g., ratings of behavioral and cognitive engagement are significantly lower in mathematics when compared to science). Numbers represent means of standardized factor scores ( $M = 0$ ,  $SD = 1$ ); the higher/lower the number, the higher/lower the value of the particular subject compared to the other subject in the pairwise comparison. No reported value means no significant difference between subjects.

†  $p < .06$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$