



## Off-task behavior in elementary school children



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### ABSTRACT

This paper reports results from a large-scale observational study investigating attention allocation during instructional activities in elementary school students (kindergarten through fourth-grade). In Study 1, 22 classrooms participated while a more diverse sample of 30 classrooms participated in Study 2. This work investigated temporal patterns in children's attention allocation by collecting observational data on children's on- and off-task behaviors at three different time points (i.e., beginning, middle, and end of the school year) [Study 1]. We also investigated whether patterns of attention allocation changed as a function of student characteristics (gender, grade-level, SES), teachers' instructional design choices (instructional format and duration of an instructional activity), and school type (private, parochial, public charter schools) [Studies 1 & 2]. Children's patterns of attention allocation fluctuated over the course of the school year. Female students were found to be more on-task compared to male students. On-task behavior tended to decline as the instructional duration increased. The lowest rates of on-task behavior were observed while children were engaged in whole-group instructional formats. An effect of school type was found with higher proportions of on-task behavior observed in parochial schools. However, the effect of grade-level was equivocal across studies. These findings can begin to form a foundation for the development of research-based guidelines for instructional design aimed to support engagement among students in elementary classrooms.

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Loss of instructional time due to off-task behavior is a well-established problem in educational settings, recognized by researchers (e.g., Carroll, 1963; Karweit & Slavin, 1981; Lee, Kelly, & Nyre, 1999) and practitioners (e.g., Lemov, 2010) for over a hundred years (cf. Currie, 1884 as cited in Berliner, 1990). Off-task behavior has been documented to negatively impact academic achievement, although the magnitude of this impact is unstable across studies (for reviews see Frederick & Walberg, 1980; Goodman, 1990). Off-task behavior is an indicator that students' attention is not focused on the instructional activity. The link between the quality of attention and task performance has also been documented in the cognitive psychology literature (e.g., Choudhury & Gorman, 2000; Dixon & Salley, 2007; DeMarie-Dreblow & Miller, 1988). Despite considerable prior research on off-task behavior,

designing effective, easy to implement, and scalable interventions to reduce off-task behavior has been challenging. Roberts (2002) suggests that many existing interventions may be unsuccessful because they do not take into sufficient account the conditions that lead to off-task behavior. The goal of the present study is to elucidate some of the factors involved in off-task behavior in elementary school settings.

### 1. Off-task behavior in elementary school students

There is a variety of reasons why loss of instructional time occurs in schools; these reasons include but are not limited to: weather (e.g., snow days), sudden onset interruptions (e.g., announcements over the loudspeakers), and special events. However, student inattentiveness (i.e., off-task behavior during instructional time) has been found to be the biggest factor that accounts for loss of instructional time (Karweit & Slavin, 1981). Prior research estimates that elementary school students spend between 10% and 50%

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of their time off-task in regular education classrooms (e.g., Fisher et al., 1980; Karweit & Slavin, 1981; Lee et al., 1999; Lloyd & Loper, 1986). Inattention or off-task behavior is a serious challenge educators face. In fact, off-task behavior has been identified as one of the most common reasons for student referrals (Roberts, 2001). While eliminating all off-task behavior is not a realistic expectation, reducing rates of off-task behavior is an important goal given the challenges that off-task behavior causes for classroom management as well as the potential implications of off-task behavior on academic achievement.

A large number of prior studies have examined off-task behavior in elementary school students; however, the generalizability of prior work is limited due to its relatively narrow scope. For example, some studies observed a few classrooms within a single grade level (e.g., Lahaderne, 1968; Samuels & Turnure, 1974). Other studies involved a large number of classrooms (e.g., 18 to 25 classrooms), but only observed a small subset of students within each classroom (e.g., Fisher et al., 1980; Karweit & Slavin, 1981). Indeed, the wide range in estimates of off-task behavior reported in the literature may be partially attributed to the relatively small sample sizes utilized in prior research, as small samples are more susceptible to the influence of extreme data points. In order to establish a more comprehensive understanding of children's on and off-task behaviors during early and middle childhood, research examining children's patterns of attention allocation on a larger scale and across multiple grade-levels is clearly needed.

The present work makes a contribution to the field due to its size and scope: this work includes a large sample size both in terms of the number of classrooms which were recruited (e.g., Study 1: 22 classrooms, Study 2: 30 classrooms) as well as the number of children within each classroom who were observed (i.e., all students in attendance were included in the study). In contrast to some prior work which tended to focus on one particular grade or a small range of grade-levels, this work conducts observations across a broad range of grade-levels in elementary school (i.e., kindergarten through fourth-grade).

A second contribution of this work pertains to the detailed coding scheme that was employed to provide a more nuanced examination of the sources of off-task behavior common in elementary school settings. Previous work examining off-task behavior in classrooms tended to treat off-task behavior as a unitary construct (e.g., Carnine, 1976; Frederick, Walberg, & Rasher, 1979; Karweit & Slavin, 1981). Consequently, the sources of children's off-task behavior remain underspecified. In the present study we delineate common types of off-task behavior including off-task peer interactions, self-distraction, and off-task behaviors directed towards aspects of the classroom environment. Identifying common types of off-task behavior in elementary school settings is critical as interventions targeting inattention will be successful only to the extent that they adequately address the source of children's off-task behavior. The types of off-task behavior measured in the present work were based on the results of a teacher survey. Thirty elementary school teachers were asked to rate the frequency of students' off-task behaviors on a scale from 1 to 4, where 1 indicates that the behavior occurs rarely and 4 indicates that the behavior is very frequent. Peers ( $M = 3.21$ ,  $SD = 0.62$ ) and self-distractions ( $M = 2.62$ ,  $SD = 0.90$ ) were identified by teachers as frequent sources of off-task behavior. Additionally, walking around the classroom (or being out of one's seat) was identified as a frequent off-task behavior by 14 of the teachers ( $M = 2.50$ ,  $SD = 0.85$ ). Off-task behavior relating to the environment was identified as another common source of distraction ( $M = 1.83$ ,  $SD = 0.85$ ). Studying off-task behaviors associated with the classroom environment is of particular interest because of the hypothesized link between off-task behavior and visual design features of

elementary school classrooms (e.g., Fisher, Godwin, & Seltmen, 2014; Godwin & Fisher, 2011). Primary classrooms often contain large amounts of stimulating sensory displays intended to increase children's motivation and engagement (Barrett, Zhang, Moffat, & Kobbacy, 2012; Tarr, 2004; Thompson & Raisor, 2013). However, there is no empirical evidence demonstrating that this design choice increases motivation and engagement. By contrast, large amounts of stimulating displays in classrooms have been described as "visual bombardment" (Bullard, 2010, p. 110) and a "cacophony of imagery" (Tarr, 2004, p. 1). Barrett and colleagues (Barrett et al., 2012) recently reported that, contrary to their initial hypothesis, high amounts of color (i.e., the degree and manner in which color was utilized in the classroom walls, furniture, and displays) was negatively associated with elementary school children's achievement scores (although note that a follow-up study by Barrett, Davies, Zhang, and Barrett (2015) reported that very low amounts of color are also negatively associated with achievement, suggesting that there may be a level of visual stimulation that is optimal for classroom settings). Furthermore, there is recent experimental evidence supporting the notion that highly decorated learning environments may actually promote off-task behavior in young children and thereby decrease learning (Fisher et al., 2014; Godwin & Fisher, 2011).

Despite a large number of studies documenting rates of off-task behavior in elementary school students, there has been limited research examining the factors associated with off-task behavior. The present work aims to address this gap in the literature by conducting an exploratory study which examines four main research questions: (1) Do patterns of attention allocation change over the course of the school year? (2) Are student characteristics (e.g., gender, grade-level, and SES) related to children's attention allocation patterns? (3) Are instructional design strategies (e.g., instructional format and duration of instructional activity) related to children's tendency to engage in on and off-task behavior? (4) Is school-type related to children's attention allocation patterns? Below we briefly discuss how each of these factors may be related to patterns of attention allocation in elementary school students.

There has been limited investigation of the variability in children's patterns of attention allocation as a function of time (Martin et al., 2015). The idea that students' attentional capacity fluctuates over the course of the school day is a common belief in education circles. Indeed, teachers report that they modify their instruction in response to fluctuations in students' levels of attention by avoiding challenging instructional activities following lunch or at the end of the school day (for discussion see Muyskens & Ysseldyke, 1998; Ammons, Booker, & Killmon, 1995). Observational research examining the effect of time of day on school children's classroom behaviors has found that inappropriate behaviors are more frequent in the afternoon compared to the morning (Muyskens & Ysseldyke, 1998). Similar findings have been obtained with children who have attention deficit disorders (e.g., Antrop, Roeyers, & De Baecke, 2005; Zagar & Bowers, 1983). Furthermore, studies using performance-based measures of attention (e.g., paper and pencil visual search tasks in which participants are asked to locate and cross out a target object from a group of distractors) have found that performance on tests of attention is highest in the mid-morning and declines mid-day, although there is some variability in the observed attention patterns for preschool children and students in primary grades (e.g., Janvier & Testu, 2007). Although levels of attention have been found to oscillate over the course of the school day, it is currently an open question if and how patterns of attention allocation change across the school year. Specifically, the proportion of on-task behavior as well as the prevalence of different types of off-task behavior may fluctuate as children become more familiar with their teacher, school rules, peers, and

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