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Supporting Students' Motivation, Engagement, and Learning During an Uninteresting Activity

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The present study examined the capacity of 2 different theoretical models of motivation to explain why an externally provided rationale often supports students' motivation, engagement, and learning during relatively uninteresting learning activities. One hundred thirty-six undergraduates (108 women, 28 men) worked on an uninteresting 20-min lesson after either receiving or not receiving a rationale. Participants who received the rationale showed greater identified regulation, interest-enhancing strategies, behavioral engagement, and conceptual learning. Structural equation modeling was used to test 3 alternative explanatory models to understand why the rationale produced these benefits—an identified regulation model based on self-determination theory, an interest regulation model based on interest-enhancing strategies research, and an additive model that integrated both models. The data fit all 3 models; however, only the model that included rationale-enhanced identified regulation uniquely fostered students' engagement and hence their learning. Findings highlight the role that externally provided rationales can play in helping students generate the autonomous motivation they need to engage constructively in and learn from uninteresting, but personally important, lessons.

Keywords: rationale, autonomous motivation, identified regulation, interest regulation, self-determination theory

As students make the transition from elementary to middle school and from middle school to high school, their workload becomes greater, academic work increases in difficulty, grading becomes more stringent, and instruction becomes less personalized (Eccles & Midgley, 1989). Not surprisingly, students' academic motivation steadily declines following this transition, as children's mostly intrinsically motivated orientation gives way to adolescents' mostly extrinsically motivated orientation (Harter, 1981, 1982). In a similar vein, students—and especially older students—report finding the learning activities they encounter in school to be lacking in direct or personal relevance to their lives as well as unexciting, unappealing, overly complex and difficult, and/or more time consuming than they prefer (Anderman & Maehr, 1994; Eccles & Midgley, 1990; Eccles & Wigfield, 1995; Goodlad, 1984; Haladyna & Thomas, 1979; Hidi & Harackiewicz, 2000; Wigfield & Eccles, 2000). When students fail to value what they are asked to learn in school, the degree of student motivation to engage in the target learning activity significantly decreases (Legault, Green-Demers, & Pelletier, 2006; Murdock, 1999; Wigfield & Eccles, 2000). This devaluing process predicts students' subsequent minimal effort, poor concentration, indifference, and general withdrawal from the activity (Legault et al., 2006; Ntoumanis, Pensgaard, Martin, & Pipe, 2004; Vallerand, Fortier, & Guay, 1997; Vallerand et al., 1993). Consequently, teachers often find themselves facing a difficult motivational problem when they attempt to motivate students during uninteresting (from the student's perspective), but potentially important (from the teachers' perspective), academic activities.

The Relation Between Values and Academic Engagement and Performance

A substantial body of research on values and academic behaviors suggests that when students value a learning activity in terms of high task value, utility value, interest value, attainment value, instrumental value, future goals, future consequences, future time perspective, and/or intrinsic goals, they become increasingly likely to actively engage in that topic, to persist in that topic over time, to achieve highly, to show relatively sophisticated self-regulation, and to understand what they are trying to learn (DeVolder & Lens, 1982; Husman & Lens, 1999; Miller & Brickman, 2004; Miller, Greene, Montalvo, Ravindran, & Nichols, 1996; Shell & Husman, 2001; Vansteenkiste, Simons, Lens, Soenens, & Matos, 2005; Wigfield & Eccles, 2000). All these studies support the general conclusion that students tend to invest more effort and achieve more when a lesson is perceived to have personal importance or relevance.

The particular importance of these findings to teachers is that when teachers try to find ways to promote students' motivation during relatively uninteresting (but potentially important) learning activities, they can successfully do so by promoting task value. One way teachers can help students value the uninteresting, but important, learning task is by providing a rationale that (a) identifies the lesson's otherwise hidden value, (b) helps students understand why the lesson is genuinely worth their effort, (c) communicates why the lesson can be expected to be useful to them, and/or (d) helps students see or discover the personal meaning within a lesson. When successful, this instructional strategy can

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help create an opportunity for students to perceive, accept, and personally endorse—hence internalize into the self-system—the value of the learning activity.

Purpose of the Present Study

Individual students bring their own influential characteristics (e.g., ability beliefs, personal interest, values) into the classroom. However, characteristics in the learning environment also affect students' motivational states, such as their interest, valuing, and effortful engagement. Focusing on these social–contextual conditions, the present study examined the effectiveness of two different theoretical models of motivation to explain why an externally provided rationale often supports students' motivation, engagement, and learning during relatively uninteresting learning activities. Because the predictions made in present study were derived from two theoretical models of motivation, the following sections review these two approaches to understanding when and why externally provided rationales can be expected to promote students' motivation during otherwise uninteresting lessons.

The Identified Regulation Model

The identified regulation model, derived from self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000) offers one explanation for why an externally provided rationale might facilitate motivation and engagement (see Deci, Eghrari, Patrick, & Leone, 1994; Reeve, Jang, Hardre, & Omura, 2002). SDT explains that when students find a learning activity to be important and personally meaningful to them—even if it is a relatively uninteresting thing to do—they experience a high-quality (i.e., autonomous) type of motivation referred to as "identified regulation" (Deci & Ryan, 1991; Ryan & Connell, 1989). Identified regulation refers to mostly internalized extrinsic motivation, as the individual has identified with the personal importance of an externally prescribed way of thinking or behaving and has thus accepted it as his or her own way of thinking or behaving (Deci & Ryan, 1991). Identified regulation is extrinsic because the activity is performed primarily because of its usefulness or instrumentality (work in order to develop a skill) rather than because it is interesting. It is self-determined because the student engages in the task willingly and for personal reasons rather than by being forced to engage the task because of external pressure. According to SDT's identified regulation model, the reason why an externally provided rationale promotes a student's internalization of task value into autonomous motivation of his or her own is because it provides the student with the information needed to self-identify with the activity as something the self willingly does because it is useful to the self (Deci et al., 1994; Reeve et al., 2002).

Deci et al. (1994) performed a laboratory experiment with a boring computer task (i.e., pressing the space bar on a keyboard whenever a light appeared on the computer screen) in which they manipulated the presence versus absence of three autonomy-supportive factors: a meaningful rationale, acknowledgment of the person's perspective (negative feelings participants might experience while undertaking such an unappealing task), and noncontrolling language that offered choice rather than pressure. The presence of a meaningful rationale did lead participants to perceive the task as an important one (relative to the condition with absence of rationale). So, by itself, the rationale increased perceptions of task importance. However, when the rationale was communicated with controlling language and without an acknowledgement of the person's perspective, perceived autonomous motivation and extent of engagement were both low. In contrast, when the rationale was communicated with noncontrolling language and with an acknowledgment of negative feelings, autonomous motivation and engagement were both relatively high (Deci et al., 1994). Hence, for a rationale to promote engagement, it must promote not only high task importance but also perceptions of autonomous motivation (i.e., identified regulation).

In extending Deci et al.'s (1994) study, Reeve and his colleagues (2002) used a more academically authentic task to experimentally test whether the provision of a rationale when delivered in an autonomy-supportive way would increase students' effort during an uninteresting (but potentially important) learning activity (i.e., asking preservice teachers to learn conversational Chinese). In this study, identified regulation was conceptualized as a latent variable defined by the pair of indicators of perceived importance of the lesson and perceived autonomy while trying to learn it. In testing this mediation model, participants in the experimental condition were provided with a rationale as to why learning conversational Chinese might be a personally useful thing for them to do (i.e., gain a new teaching skill). Compared with participants not given this rationale, participants given the rationale showed greater effort. A motivational mediation model further showed that the reason why participants with the rationale showed the greater effort was because they felt an identified experience consisting of both a sense of ownership of the task (perceived autonomy) and a sense of task value (perceived importance). Thus, the reason why the externally provided rationale (delivered in an autonomy-supportive way) increased effort was because it allowed participants to experience higher identified regulation during the lesson.

Interest Regulation Model

The interest regulation model, derived from Sansone and her colleagues' work (Sansone, Weir, Harpster, & Morgan, 1992), offers a second explanation for why an externally provided rationale might facilitate motivation and engagement. The interest regulation model explains that when people find a learning activity to be boring but inevitable, they generally attempt to regulate their interest by self-generating strategies designed to raise their immediate or situational interest to a level that is high enough to get through the otherwise uninteresting endeavor. These self-generated regulatory strategies are called interest-enhancing strategies (IESs; Sansone et al., 1992). Some of the most frequently used IESs include the strategies of setting a goal (Green-Demers, Pelletier, Stewart, & Gushue, 1998), varying the procedure so as to perform the same task in different ways (Sansone, Wiebe, & Morgan, 1999), working in the company of stimulating others such as friends (Isaac, Sansone, & Smith, 1999), and trying to make the task into a game (Wolters, 1998).

To test their hypothesis, Sansone et al. (1992) asked participants to perform a repetitive and boring activity—namely, repetitively copying pages of random letters. Prior to engaging in the boring copying task, participants were either provided or not provided

with a rationale (i.e., performing the task on a regular basis was said to yield health benefits). Sansone et al. predicted that participants performing the copying task with the knowledge of potential health benefits would be most likely to engage in the IESs because they had sufficient reason (the potential health benefit) to expend the effort. Sansone et al. found that hearing a rationale helped participants transform the otherwise boring task into a potentially more interesting one. For example, participants given the rationale performed the copying task more creatively (i.e., less repetitively). This modification, Sansone et al. argued, made the task temporarily more interesting. In a similar (but correlational) study, Wolters (1998) found that college students self-reported more frequent use of IESs to regulate their low motivation during uninteresting academic tasks. These students reported that when they had a strong need to study uninteresting lectures or textbook readings, they became more likely to "make studying into a game" or, simply, "try to make studying more interesting" (Wolters, 1998, p. 229).

Although not studied extensively, there is also evidence linking the use of IESs to greater subsequent effort and persistence. Sansone et al. (1992) found that students who generated an IES in their experimental study persisted longer at the repetitive letter-copying task than did students who did not use such a strategy. Wolters (1999), too, reported a positive correlation between high school students' reported use of IESs and their degree of not only self-reported effort but also some specific study strategies, such as organization and monitoring.

In interpreting these findings, rationales produce motivational benefits because they prompt people to begin a mental search to find a way to make the uninteresting and unavoidable activity into something tolerable enough to get through it (Sansone & Smith, 2000). That is, when a task is uninteresting and when a rationale deems its performance to be a necessity, people generate more effort-promoting IESs.

Hypotheses

As reviewed above, two independent explanations have been put forth to explain why externally provided rationales support students' motivation and engagement. According to SDT, externally provided rationales promote engagement-enhancing identified regulation and internalization of task value into the self-system. According to the interest regulation model, externally provided rationales promote engagement-fostering IESs. Still, although these two different theoretical explanations are informative, it is not yet clear why students show increased engagement during uninteresting tasks in the presence of a rationale. To deepen psychological understanding, the two existing explanations need to be tested further—both independently and in combination with each other.

In the present study, it is hypothesized that, compared with participants not receiving an externally provided rationale, participants receiving an externally provided rationale will display a host of positive outcomes, including motivation, engagement, and conceptual learning. The dependent measures to index the quality of students' learning experience are as follows. The first four measures assess the quality of students' motivation and include concepts from both SDT (perceived autonomy, perceived importance) and the interest regulation model (IESs—essay and checklist). IESs–essay represent the number of IESs participants spontaneously generated on an open-ended question, whereas IESs–checklist represent the number of IESs participants reported using from a prepared checklist of four possible strategies they might have used. The fifth and sixth measures assessed the extent of students' engagement during the learning activity, as scored by trained raters (observers) during both the first (Time 1) and last (Time 2) 10 min of the learning session. The last two measures assessed the quality of participants' learning, including measures of both factual and conceptual learning.

The reason why engagement was measured during two different intervals (Time 1 and Time 2) was to detect the enduring effect of the rationale on participants' engagement over time. As shown in Sansone et al.'s (1992) and Reeve et al.'s (2002) studies, participants with the rationale (vs. its absence) were expected to maintain their task engagement longer compared with participants in the control group, either because IESs made the learning activity more tolerable (Sansone et al., 1992) or because participants identified with the task's value (Reeve et al., 2002).

As to the two measures assessing the quality of students' learning, factual learning refers to rote learning and the extent to which participants were able to repeat facts presented during the lesson whereas conceptual learning refers to understanding the core or main ideas discussed during the lesson. I predicted that although participants who receive a rationale will show greater conceptual learning than participants who do not receive a rationale, factual learning will not substantially differ between the two groups. This prediction is based on multiple tests of SDT that have shown that autonomous motivation (e.g., identified regulation) predicts conceptual, but not necessarily factual or rote, learning (Benware & Deci, 1984; Grolnick & Ryan, 1987; Vansteenkiste et al., 2005). This is so because students with autonomous motivation experience a deep, thoughtful, and task-orientated commitment toward learning, and these students process information in a more conceptual and integrative manner, compared with their counterparts. In contrast, these studies report that students with low autonomous motivation still show relatively high factual learning because factual or rote learning requires a more straightforward path to the solution, such as memorization (Benware & Deci, 1984; Grolnick & Ryan, 1987; Vansteenkiste et al., 2005).

To examine why a rationale supports students' motivation, engagement, and learning during an uninteresting lesson, three possible explanatory models are proposed (see Figure 1). Model 1 depicts SDT's identified regulation (or internalization) model. It is a motivational mediation model in which the rationale facilitates identified regulation, which, in turn, facilitates engagement, which, in turn, enhances conceptual learning. To operationally define identified regulation as a latent variable, the two indicators of perceived autonomy and perceived importance were assessed (following Reeve et al., 2002). In testing the identified regulation model (Model 1), the present study sought to replicate previous SDT research showing that rationales, when presented in autonomy-supportive ways, facilitate students' identified regulation (internalization) and engagement. It is important to note, however, that the present study added a learning outcome to test whether the engagement engendered by the rationale and accompanying identified regulation would enhance students' conceptual

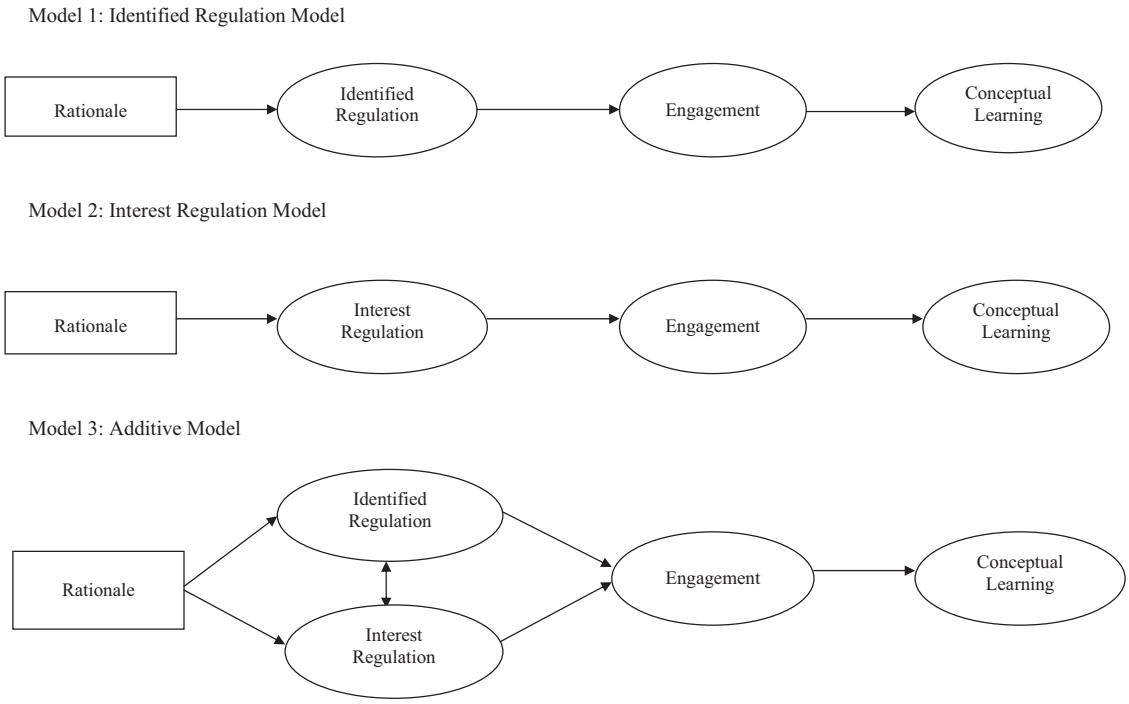

Figure 1. Three hypothesized models.

learning. Thus, this learning outcome was an important addition to Reeve et al.'s (2002) identified regulation model.

Model 2 depicts the interest regulation model. It also is a motivational mediation model. In this model, the rationale facilitates interest regulation through the creation and use of IESs, which, in turn, facilitate engagement, which, in turn, enhances conceptual learning. To operationally define interest regulation as a latent variable, I assessed two indicators of the creation and utilization of IESs. The first reported IESs using an open-ended essay format; the second reported the number of IESs checked off of a prepared list of four possible strategies. In testing the interest regulation model (Model 2), the present study sought to replicate previous interest regulation research showing that rationales prompt individuals to create and use IESs. Although the correlation between use of IESs and persistence or extended effort exists, no previous work in this area has experimentally tested the relation that interest regulation has to a learning outcome. Thus, this learning outcome was an important addition to the interest regulation model.

Model 3 depicts an additive model in which the rationale facilitates both identified regulation and interest regulation, both of which, in turn, contribute a unique positive effect on engagement. Further, engagement enhances conceptual learning. This additive model simply combines Model 1 (identified regulation model) and Model 2 (interest regulation model) but, in doing so, allows the key motivational construct from each model to compete to explain the variance in engagement. This will allow a determination of whether identified regulation and interest regulation are additive or whether only one of these motivational processes is sufficient to explain engagement.

Method

Participants

Participants included 136 college students (108 women, 28 men) recruited from sections of an introductory educational psychology class at a large Midwestern university. All participants were enrolled in the teacher certification program and were preparing to become teachers after graduation. In exchange for their participation, each participant received extra course credit.

Uninteresting Activity

The learning activity was selected on the basis of three characteristics: (a) Students would not generally perceive it to be intrinsically interesting, (b) it represented an ecologically valid and school-like lesson, and (c) it possessed hidden value and relevance so that participants could potentially find some personal utility within it. For the uninteresting—yet potentially worthwhile—ecologically valid lesson, I imported a lesson on correlations from an introductory-level statistics textbook for undergraduates (Frederick & Wallnau, 2002). The learning material featured a six-page text-based lesson that covered the following topics: correlation coefficient, scatterplots, correlation and prediction, and correlation and causation. Learning about correlations can be an interesting activity, but for the purposes of the present study, the lesson was presented in an uninteresting format in that it was designed to be both monotonous (following Berlyne, 1966) and void of interest-enhancing embellishments (following Parker & Lepper, 1992). Pilot testing with 32 participants indicated that participants found the lesson to be relatively uninteresting ($M = 2.17$ on a 7-point

Likert scale with 1 = *not at all interesting* and 7 = *extremely interesting*). The pilot test also confirmed that these 32 participants found 20 min to be an appropriate amount of time to learn the lesson (M = 6.25 on a 7-point Likert scale with 1 = *not at all, too little time* and 7 = *very appropriate*).

Rationale

An externally provided rationale is a verbal explanation as to why putting forth effort during an activity is a useful and worthwhile thing to do. Past motivation research makes it clear, however, that some rationales are better than others when it comes to engaging students in learning activities. Rationales that are presented in controlling ways ("Do it because I said so" or "Do it because there will be a test") do not help students internalize the value of the activity (Deci et al., 1994; Reeve et al., 2002). In contrast, rationales that are provided in an autonomy-supportive way do help students internalize the value of the activity (Deci et al., 1994; Reeve et al., 2002). For this reason, the rationale manipulation was operationally defined as an externally provided rationale delivered in an autonomy-supportive way. To deliver the rationale in an autonomy-supportive way, I communicated the rationale to participants with both noncontrolling language and the acknowledgement of possible negative feelings.

The content of the rationale used in the present study—namely, that learning correlations is an opportunity to cultivate useful teaching knowledge—was constructed on the basis of rationales offered in several different introductory statistics textbooks explaining the merits of learning about correlations. Once constructed, the rationale was pilot tested with a different group of 35 participants by confirming that they perceived it to be relatively convincing (M = 5.78 on a 7-point Likert scale with 1 = *not at all convincing* and 7 = *very convincing*). The rationale (with embedded noncontrolling language and the acknowledgement of negative feelings) was as follows:

> Learning about correlations has been shown to be useful. Those participants who have learned about correlations featured in today's lesson have reported that it helped them become a more reflective teacher. They became more reflective because the lesson learned helps them to see relationships that the naked eye might miss. Correlations summarize vast information to help teachers explore issues, answer questions, solve problems, and make decisions. This is why many educational journals, internet educational websites, and textbooks present information using correlations. For example, a quick glance at the newspaper yields statistics that communicate research findings on new teaching methods, parent–school relations, new instructional technologies, student–teacher relationships, teachers' average income, and so on.
>
> Learning about correlations may not be much fun for some of you. So it is understandable that you might not find it very interesting. Nonetheless, today's lesson is particularly designed to help you think about how two variables might or might not be related to one another or whether one variable predicts or causes the other. Once learned, the correlations featured in today's lesson will open the door for you to gain useful skills, ones that will be very handy when you need to interpret information presented through statistical tools. This is the reason why you are being asked to concentrate, persevere, and try hard on the lesson.

Procedure

All materials, including the rationale, were presented in booklets. The reason the material was presented in booklets (instead of by an experimenter) was to control for extraneous factors, minimize potential demand characteristics, and increase the study's internal validity (following Deci et al.'s, 1994, research paradigm). Participants were randomly assigned to one of two groups (control condition, experimental condition) and were tested in small groups, with an average of 6 individuals per group. Participants were seated such that they had no contact with other participants. Before the experiment began, all participants completed a consent form and preexperimental questionnaire assessing demographic information.

During the experimental session, two main events occurred. First, the experimenter announced a 3-min introductory period. During this period, the independent variable was manipulated in that each participant received a sheet containing one of two instructions (one with instructions and a rationale, one with instructions and no rationale) according to a random sequence within session. Participants were asked to read the instruction silently. The sheet began with the following general instruction (following Benware & Deci, 1984):

> Please use these materials (that you will be given) to learn about correlations. The following topics are covered in the lesson: correlation, correlation coefficient, scatterplots, correlation and prediction, and correlation and causation. Read and study the text materials in the same manner that you would read and study any text assigned in one of your college courses. Please feel free to write on the material or to take notes on the papers provided.

Participants in the experimental condition received additional instruction that included the rationale. Participants in the control condition did not receive this additional instruction.

Second, a 20-min individual learning session followed. During this learning session, all participants received the same six-page booklet of learning materials and were asked to study the materials for 20 min. Participants read and studied silently while working independently and at their own pace. During this period, two trained raters who were naive to the experimental condition independently and surreptitiously scored how behaviorally engaged versus disengaged each participant appeared to be. The raters sat nonintrusively in the corner of the classroom and made independent ratings. The raters scored participants' engagement objectively so that the present study could advance prior studies in this area of research that had used only self-reported engagement scores. After the learning period ended, the experimenter announced that the study time had ended and administered the postexperimental questionnaire. After the postexperimental questionnaires were collected, the experimenter administered an unannounced test to assess learning. Last, all participants received a debriefing.

Measures

Identified regulation. Identified regulation consists of the compound psychological experience of high perceived importance and high perceived autonomy (Reeve et al., 2002). Perceived autonomy was assessed with the nine-item Perceived Autonomy

Scale (Reeve, Nix, & Ham, 2003). The scale has three items to assess an internal perceived locus of causality (e.g., "During the lesson, I felt I was doing what I wanted to be doing"), three items to assess volition (e.g., "During the lesson, I felt free"), and three items to assess perceived choice over one's actions (e.g., "I felt I had control to decide what to do and whether to do it"). Each item used a 7-point Likert scale (1 = *not at all true*, 7 = *very much true*), and scores from these nine items intercorrelated highly enough to average into a single score ($\alpha = .83$). Scores on the Perceived Autonomy Scale have been shown to be valid in that they are sensitive to autonomy-supportive versus controlling teaching styles and predict various measures (self-report, behavioral) of intrinsic motivation (Reeve et al., 2003).

Perceived importance was assessed with a perceived importance scale from a previous study (Reeve et al., 2002). Each of the four items used a 7-point Likert scale (1 = *not at all true*, 7 = *very much true*) with the stem, "Learning the lesson about correlations was . . . :" an important thing to do, pointless—a waste of my time (reverse scored), valuable, and worthwhile—it was time well spent. Scores from these four items intercorrelated highly enough to average into a single score ($\alpha = .87$). Scores on this perceived importance scale have been shown to be valid in that they are sensitive to teacher-provided rationales and able to predict engagement during a learning activity (Reeve et al., 2002).

Interest regulation. Interest regulation consists of the two indicators of the number of IESs participants reported using during the 20-min study session. The IESs–essay measure used the open-ended question,

> During the 20 minute lesson, what did you do to make this learning activity a more interesting thing to do (if anything)? Perhaps you didn't do anything to make the lesson seem more interesting, but if you did use such a strategy, please write your strategy or strategies in the space below.

Two trained independent raters coded the responses using a scoring system derived from empirical work on IESs (following Sansone et al., 1992). From these essays, raters identified and scored the four nominated IESs: (a) set a goal (e.g., "finish prior to a time limit"), (b) used a fantasy context (e.g., "pretended to teach the lesson to someone else"), (c) introduced variety within the task (e.g., "varied how I did the task"), and (d) added stimulation (e.g., "drew a diagram"). Interrater reliabilities were high ($r = .92$), so the raters' scores were averaged into a single score, called IESs–essay.

From pilot testing and from Sansone and colleagues' (1992) work, which IESs participants might use could be anticipated. Hence, a checklist was prepared to score participants' responses on a 4-point scale. The first item asked the participant to check whether or not he or she set a goal: "I set a goal for myself." The second item asked whether the participant used a fantasy context: "I imagined, pretended, or fantasized myself teaching or explaining this material to someone (e.g., my students)." The third item asked whether the participant introduced variety within the task: "I varied the task in some way (e.g., by switching my attention from one part of the text to another part)." Last, the fourth item asked whether the participant added stimulation: "I drew a picture or diagram to stimulate or entertain myself." Participants were asked to check off which specific strategies they used among the four listed. Checking any one individual strategy constituted a separate point on the scale. For instance, a student who reported using a fantasy context but not goal setting, variety, or stimulation scored a 1 on the IESs–checklist measure. The checklist appeared on the postexperimental questionnaire after participants had already completed the open-ended essay question.

To validate both measures, participants completed a three-item self-report measure of interest (Williams, Wiener, Markakis, Reeve, & Deci, 1994). Each item used the same 7-point response scale (1 = *not at all true*, 7 = *very much true*) with the stem, "Please rate 'learning about correlations' as an activity:" it held my full and constant attention, it stimulated my curiosity without interruption, and it was very interesting. These three items were averaged into a single score for interest ($\alpha = .90$). This measure has been shown to be valid in that scores predict behavioral measures of intrinsic motivation (Reeve, 1989) and career choice decisions (Williams et al., 1994). In the present study, this self-report interest measure correlated significantly with the use of IESs as reported on both the essay, $r(136) = .34$, $p < .01$, and checklist, $r(136) = .26$, $p < .01$, measures. These positive correlations are important because they confirm that the degree to which these strategies were used was positively associated with interest.

Engagement. Raters scored three aspects of participants' engagement during the lesson (based on Skinner & Belmont, 1993): on-task attention, effort, and persistence. To score these three behavioral expressions of engagement, two trained raters used a rating sheet with 7-point bipolar scales. For on-task attention, the bipolar descriptors were dispersed–off task (scored as 1) versus focused–on task (scored as 7). For effort, the bipolar descriptors were passive, slow, or minimal effort (scored as 1) versus active, quick, or intense effort (scored as 7). For persistence, the bipolar descriptors were gives up easily during challenge, failure, or confusion (scored as 1) versus persistent (scored as 7). During the 20-min lesson, two trained raters who were naive to the experimental condition independently made two separate ratings—one during the first 10 min and the second during the last 10 min. The reason why engagement was measured during two different times was, as mentioned earlier, to detect the effect of the rationale on engagement over time.

For both rating periods, raters' scores correlated highly with one another. The intercorrelations between the two raters at Time 1 (first 10 min) were as follows: attention, $r = .76$, $p < .01$; effort, $r = .75$, $p < .01$; and persistence, $r = .76$, $p < .01$. The intercorrelations between the two raters at Time 2 (last 10 min) were as follows: attention, $r = .90$, $p < .01$; effort, $r = .88$, $p < .01$; and persistence, $r = .86$, $p < .01$. Because interrater reliabilities were high, the pairs of scores from the two raters were averaged to form a single score for attention, effort, and persistence at each time period. Once done, the three engagement ratings (attention, effort, and persistence) were averaged into the two following engagement scores: engagement at Time 1 (three items, $\alpha = .96$) and engagement at Time 2 (three items, $\alpha = .97$).

Learning. Following Benware and Deci (1984), the dependent measure to assess the two types of learning was scored from a 14-item multiple-choice examination. Each question was designed to measure either factual learning or conceptual learning of the material. To construct this measure, experts in the statistics department at a major university read the text and created 14 factual questions to assess recognition of facts and 14 questions to assess conceptual understanding of the information. Two expert raters

then independently scored each question categorically as either a factual question or a conceptual question. Only those items that received an identical factual–conceptual classification by the two experts were used in the study. The final test featured seven factual questions and seven conceptual questions. An example of a factual learning question was, "A correlation coefficient indicates the . . ." (followed by four response options). An example of a conceptual learning question was, "Which of the following questions is best suited for correlational research?" (followed by four response options). Possible scores for both the factual learning test and the conceptual learning test could range from 0 to 7.

Results

Descriptive statistics for the eight dependent measures appear in Table 1, broken down by experimental condition. A series of *t* tests was used to test for mean differences between the experimental and control groups. To conduct seven independent tests (eight dependent measures minus factual learning) and still protect against making a Type 1 error, I calculated what each testwise alpha level must be to produce an overall experimentwise (exp) alpha level of .05. With seven tests, the $\text{alpha}_{\text{exp}}$ was inflated to .30 (using $\alpha_{\text{test}} = .05$, one-tailed; based on Hays's, 1984, formula of $\alpha_{\text{exp}} = 1 - [1 - .05]^7$). So, to readjust the inflated .30 $\text{alpha}_{\text{exp}}$ back down to .05, I computed what each $\text{alpha}_{\text{test}}$ needed to be for each correlation test. This value was .014 (based on Hays's, 1984, formula of $\text{alpha}_{\text{test}}$/number of tests, or $.05_{\text{one-tailed}}/7$). Because my hypotheses were directional, using a one-tailed test was both more suitable and more powerful (Hopkins, Glass, & Hopkins, 1987; Minium, King, & Bear, 1993).[1] Prior to conducting these *t* tests, I first explored whether gender influenced any motivation, engagement, or learning measure. A series of *t* tests were performed, and results showed that gender did not influence any of the study's eight dependent measures. The data for each dependent measure were therefore collapsed across gender.

The provision of an externally provided rationale enhanced motivation, and this was true for all four measures, including perceived autonomy ($d = 0.55$), perceived importance ($d = 0.71$), IESs–essay ($d = 0.56$), and IESs–checklist ($d = 0.42$). The provision of an externally provided rationale enhanced engagement, and this was true for both engagement at Time 1 ($d = 0.44$) and engagement at Time 2 ($d = 0.64$). For learning, the provision of an externally provided rationale enhanced conceptual learning ($d = 0.39$) but not factual learning.

Effect of the Rationale on Engagement Over Time

As reported, raters scored the participants who received the rationale as significantly more engaged during the 20-min lesson than participants who did not receive the rationale. To test whether the rationale supported an engagement-fostering benefit over time, I performed a repeated-measures analysis using the presence versus absence of the rationale as the between factor and the rating period (Time 1, Time 2) as the within factor. Both the rationale, $F(1, 134) = 13.08$, $p < .001$, and the rating period, $F(1, 134) = 140.63$, $p < .001$, were individually significant, as the rationale facilitated engagement and engagement decreased over time. Of more importance, however, the Rationale × Rating Period interaction effect was significant, $F(1, 134) = 7.72$, $p < .01$, as the rate of disengagement from the uninteresting lesson for participants in the control group was significantly more pronounced than it was for participants who received the rationale, as shown in Figure 2. This is an important finding because it indicates that the motivational benefits from the rationale (i.e., identified regulation, interest regulation) became increasingly important to sustaining engagement as the lesson continued over time.

Test of Hypothesized Models

The three hypothesized models were tested with structural equation modeling using LISREL 8.51 (Jöreskog & Sörbom, 2001). To test the fit of the data to the hypothesized models, I followed the two-step approach recommended by Anderson and Gerbing (1998). First, to determine whether the indicators related satisfactorily to the latent variables, I performed a confirmatory factor analysis to assess the fit of the measurement model. Second, the series of three hypothesized models (see Figure 1) were tested as structural models. To evaluate the fits of the measurement and structural models, I relied on a set of five test statistics. Traditionally, a nonsignificant chi-square serves as the basic test of whether a model adequately describes the data (Bollen & Long, 1993); however, I further included a set of fit indices because they often provide a better evaluation of model fit than does the chi-square statistic (Bentler & Bonett, 1980; Marsh, Balla, & McDonald, 1988). Those four fit indices were the root-mean-square error of approximation (RMSEA), the root-mean-square residual (RMR), the nonnormed fit index (NNFI), and the comparative fit index (CFI). RMSEA and RMR are summary statistics for the residuals, so the lower the number, the better (i.e., RMR and RMSEA $< .05$, down to a possible low of 0; Hu & Bentler, 1999). NNFI and CFI compare the lack of fit of the theoretical model to the independence model, so the higher the number, the better (i.e., NNFI and CFI $> .95$, up to a possible high of 1; Hu & Bentler, 1999).

According to the chi-square statistic and the goodness-of-fit indices, the measurement model fit the observed data well, $\chi^2(9, N = 136) = 5.58$, *ns*, RMSEA = .00, RMR = .03, NNFI = 1.00, CFI = 1.00. In examining the parameter estimates, each measure–indicator loaded significantly and positively on its appropriate latent factor.

To conduct the main structural model analyses, I categorically scored the provision of a rationale—the manipulated predictor variable—as 0 for absence of a rationale and as 1 for the provision of a rationale. Means, standard deviations, and intercorrelations among the eight measures included in the hypothesized models appear in Table 2.

Hypothesized Model 1. The identified regulation model proposed that the rationale would enhance participants' identified regulation, which would increase participants' engagement, which, in turn, would enhance their learning (see Figure 3). This model fit the

[1] One-tailed tests were used because participants' initial orientation to the lesson in terms of motivation and prior knowledge in both groups (experimental vs. control) was already low. Hence, it was doubtful that participants who received a rationale in the present study would show a significant decrease in these items compared with participants in the control group. Also, no previous study has shown that participants with a rationale scored lower on a measure of motivation, engagement, or learning than did participants without a rationale (Benware & Deci, 1984; Deci et al., 1994; Reeve et al., 2002; Sansone et al., 1992).

Table 1
Means (and Standard Deviations) for Each Dependent Measure by Experimental Condition

Dependent measure	Possible range	Experimental condition: Rationale absent (n = 67)	Experimental condition: Rationale present (n = 69)	$t(134)$
Perceived autonomy	1–7	4.28 (1.07)	4.87 (1.07)	3.57*
Perceived importance	1–7	3.89 (1.22)	4.66 (0.94)	4.30*
Interest-enhancing strategies—Essay	0–4	0.38 (0.52)	0.69 (0.58)	3.26*
Interest-enhancing strategies—Checklist	0–4	0.99 (0.86)	1.35 (0.84)	2.49*
Behavioral engagement, Time 1	1–7	5.44 (1.10)	5.86 (0.81)	2.50*
Behavioral engagement, Time 2	1–7	3.70 (1.66)	4.72 (1.51)	3.73*
Factual learning	1–7	5.70 (1.27)	6.07 (1.18)	1.76
Conceptual learning	1–7	5.27 (1.45)	5.87 (1.14)	2.69*

* $p < .014$.

observed data well, $\chi^2(7, N = 136) = 2.65$, *ns*, RMSEA = .00, RMR = .02, NNFI = 1.00, CFI = 1.00. As shown in Figure 3, each of the hypothesized paths within the identified regulation model was significant and in the predicted direction, as the rationale predicted identified regulation ($\beta = .42$, $p < .01$), and identified regulation predicted engagement ($\beta = .33$, $p < .01$), which, in turn, predicted learning ($\beta = .45$, $p < .01$). Further, the direct (unmediated) path from the rationale to engagement was not significant ($\beta = .19$, *ns*), showing that identified regulation, rather than the provision of the rationale per se, best explained extent of engagement. The overall identified regulation model explained 19% of the variance in engagement and 20% of the variance in learning.

Hypothesized Model 2. The interest regulation model proposed that the rationale would enhance participants' interest regulation, which would increase their engagement, which, in turn, would enhance their learning (see Figure 4). This model fit the observed data well, $\chi^2(7, N = 136) = 6.54$, *ns*, RMSEA = .00, RMR = .04, NNFI = 1.00, CFI = 1.00. As shown in Figure 4, each of the hypothesized paths within the interest regulation model was significant and in the predicted direction, as the rationale predicted interest regulation ($\beta = .41$, $p < .01$), and interest regulation predicted engagement ($\beta = .25$, $p < .01$), which, in turn, predicted learning ($\beta = .44$, $p < .01$). However, unexpectedly, the direct path from the rationale to engagement remained significant ($\beta = .22$, $p < .05$),

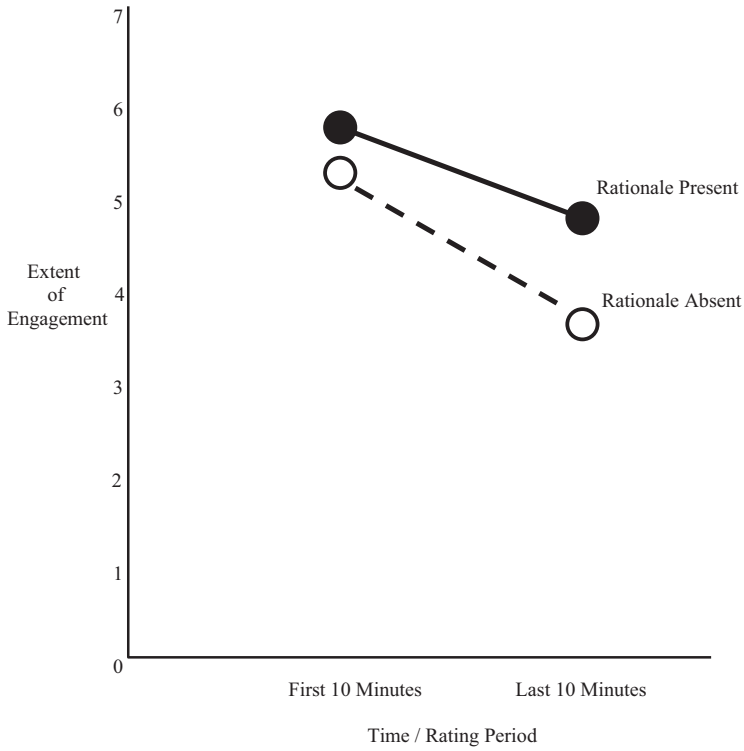

Figure 2. Effects of rationale and rating period on participants' engagement.

Table 2
Descriptive Statistics and Intercorrelation Matrix for all Dependent Measures Included in Hypothesized Models

Dependent measure	*M*	(*SD*)	1	2	3	4	5	6	7	8
1. Rationale	0.51	(0.50)	—	.30**	.35**	.27**	.21*	.21*	.31**	.23**
2. Perceived autonomy	4.57	(1.00)		—	.59**	.41**	.36**	.19*	.30**	.14
3. Perceived importance	4.28	(1.10)			—	.35**	.30**	.17*	.31**	.12
4. Interest-enhancing strategies—Essay	0.54	(0.57)				—	.35**	.06	.21*	.04
5. Interest-enhancing strategies—Checklist	1.17	(0.87)					—	.05	.19*	.17*
6. Behavioral engagement, Time 1	5.65	(0.98)						—	.63**	.30**
7. Behavioral engagement, Time 2	4.42	(1.66)							—	.43**
8. Conceptual learning	5.57	(1.33)								—

Note. The possible range for each dependent measure was from 1 to 7, except for Measures 4 and 5; the possible range for these measures was from 0 to 4. $N = 136$. * $p < .05$, one-tailed. ** $p < .01$, one-tailed.

showing that interest regulation only partially mediated the effect that the provision of a rationale had on engagement. The overall identified regulation model explained 16% of the variance in engagement and 20% of the variance in learning.

Hypothesized Model 3. The additive model proposed that the rationale would enhance both participants' identified regulation and interest regulation (see Figure 5). This model further predicted that both identified regulation and interest regulation would each contribute uniquely and positively to predicting participants' engagement. Finally, the additive model predicted that extent of engagement would predict learning. The additive model fit the observed data well, $\chi^2(15, N = 136) = 9.05$, *ns*, RMSEA = .00, RMR = .03, NNFI = 1.00, CFI = 1.00. As shown in Figure 5, the rationale significantly predicted both identified regulation ($\beta = .41$ $p < .01$) and interest regulation ($\beta = .41$, $p < .01$). In the prediction of engagement, however, identified regulation predicted engagement ($\beta = .32$, $p < .01$) but interest regulation did not ($\beta = .02$, *ns*). Further, the direct (unmediated) path from the rationale to engagement was not significant ($\beta = .18$, *ns*). The overall addictive model explained 19% of the variance in engagement and 20% of the variance in learning. Of note, the key motivational constructs were not additive in the effects on engagement; when they competed for variance, only identified regulation predicted engagement.

Conclusion. All three structural models fit the data equally well, all three models accounted for a comparable amount of the variance in both engagement and learning, and no model fit the data significantly better than did another. The reason why Model 2 is the less favored model is because it needed the rationale to explain engagement, whereas Models 1 and 3 did not. As shown in Model 3, the reason why rationale predicted engagement in Model 2 was because the rationale facilitated the identified regulation process. Hence, although all three models fit the data comparatively well, the pattern of significant and nonsignificant paths to engagement made it clear that engagement was facilitated by identified regulation and not by interest regulation.

Discussion

Recognizing that an externally provided rationale can promote students' motivation and engagement during an uninteresting lesson, the present study sought to provide a theoretical and comprehensive understanding of the functional motivational significance that an externally provided rationale can have on students' engagement and learning. Findings showed that an externally provided rationale, when delivered in an autonomy-supportive way, promoted a relatively high-quality learning experience for participants, as assessed by their motivation, engagement, and conceptual learning (see Table 1). These findings confirm past research findings showing the motivational benefits of externally provided rationales during uninteresting learning activities. Findings in the

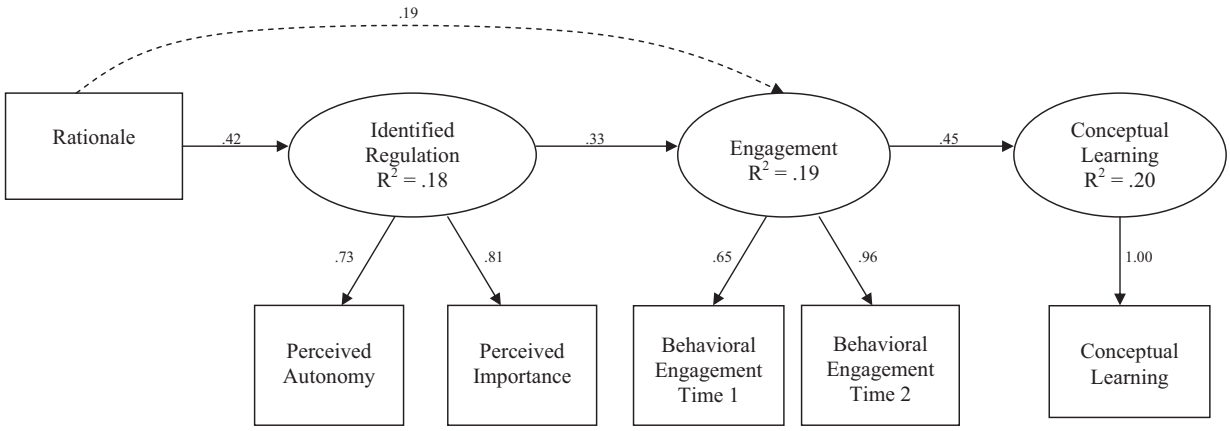

Figure 3. Standardized parameter estimates from the LISREL analysis of Model 1: the identified regulation model. Solid lines represent significant paths, $p < .05$; dashed lines represent nonsignificant paths.

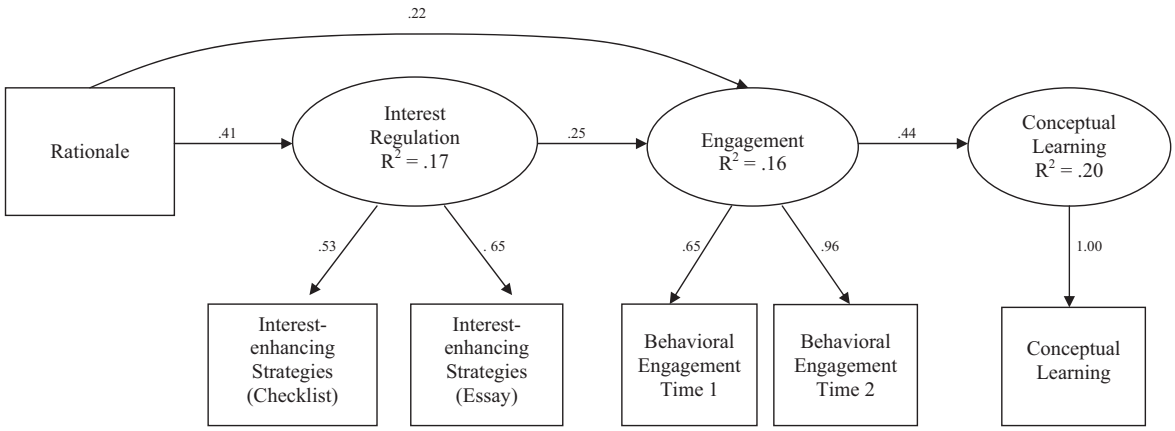

Figure 4. Standardized parameter estimates from the LISREL analysis of Model 2: the interest regulation model. Solid lines represent significant paths, $p < .05$; dashed lines represent nonsignificant paths.

present study further allow psychologists to answer the question of why such rationales generate these benefits.

Why a Rationale Supports Students' Motivation, Engagement, and Learning

The empirical test of the identified regulation model (see Figure 3) showed that the identified regulation model fit the data well. According to SDT, rationales facilitate engagement and learning because a rationale, when communicated in an autonomy-supportive way, reveals an activity's value and personal benefit (Ryan & Deci, 2000, 2002). Such personal relevance information helps participants identify with and internalize the value of the task (identified regulation), and this internalization allows participants to engage volitionally in the learning activity. Thus, although the activity itself was inherently uninteresting, the externally provided rationale facilitated

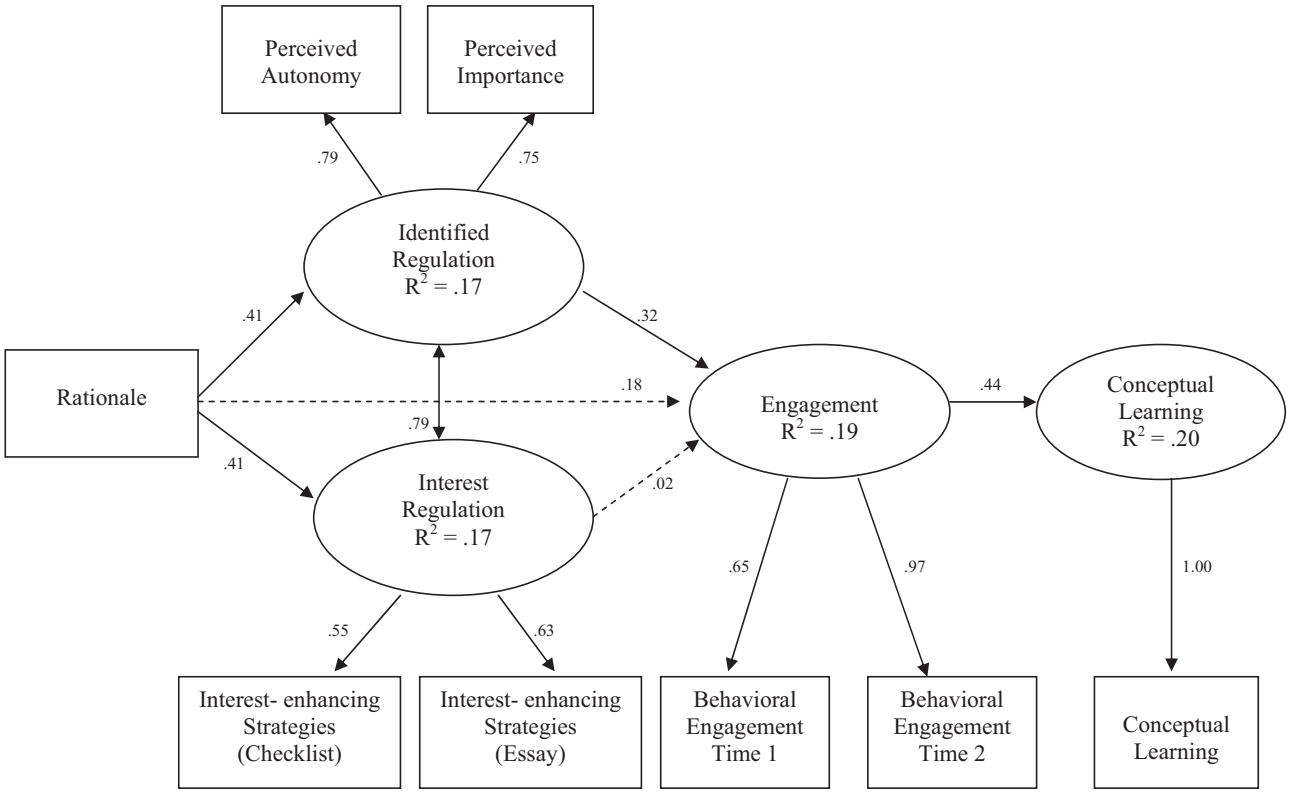

Figure 5. Standardized parameter estimates from the LISREL analysis of Model 3: the additive model. Solid lines represent significant paths, $p < .05$; dashed lines represent nonsignificant paths.

participants' capacity to take on the externally provided rationale as their own self-endorsed reason to try hard. Once experienced, identified regulation was largely an engagement-fostering process, and extent of engagement explained learning.

The empirical test of the interest regulation model (see Figure 4) also fit the observed data well. According to the interest regulation model (Sansone et al., 1992), rationales facilitate engagement and learning because a rationale helps participants see the otherwise uninteresting activity as a necessary undertaking. Perceiving an uninteresting activity as a necessity prompts people to generate the IESs they need to make the activity tolerable. Although interest regulation did promote engagement, the rationale unexpectedly exerted a direct effect on engagement as well. This means that interest regulation explained only part of the reason why the rationale promoted engagement. Examination of the additive model revealed the reason why the rationale continued to exert a direct effect on engagement in the interest regulation model—namely, because this model did not include the important motivational mediating variable of identified regulation.

The empirical test of the additive model (see Figure 5) showed that the additive model fit the data well. As expected, the provision of a rationale promoted both identified regulation and interest regulation. When both these effects were considered together, the identified regulation effect on engagement was significant whereas the interest regulation effect was not. That is, adding the interest regulation path to engagement did not allow the additive model to explain any additional variance in engagement (or learning) beyond that explained by the identified regulation model itself. Hence, the additive model simply restates the identified regulation model but adds the tangential path from the rationale to enhanced interest regulation.

The findings reported for the additive model suggest that the reason why interest regulation has predicted task persistence in previous studies (Sansone et al., 1999; Werner & Makela, 1998) is probably because of the close association IESs have with identified regulation ($\beta = .79$, $p < .01$; see Figure 5). Hence, although IESs help make an otherwise uninteresting learning experience more tolerable (less boring), they do not necessarily enhance engagement above and beyond the engagement-fostering properties of identified regulation. This is not to say that interest regulation does not play a meaningful role in the experience of uninteresting lessons. For instance, the use of IESs was significantly correlated with relatively high interest. Such a gain in positive emotion and subjective well-being is important and meaningful for its own sake. However, in the present study, interest regulation did not serve as an independent (unique) engagement-fostering strategy. This interpretation is consistent with Burton, Lydon, D'Alessandro, and Koestner's (2006) finding that identified regulation uniquely predicts effort and achievement (but interest regulation does not), whereas interest regulation uniquely predicts psychological well-being (but identified regulation does not).

Classroom Implications

To facilitate students' motivation, rationales need to produce two effects: Students need to see the importance and personal utility within the task, and students need to perceive high autonomy while working on that task. The content of an externally provided rationale accomplishes the first purpose, whereas the way it is communicated—in an autonomy-supportive way—accomplishes the second purpose. When rationales are communicated in an autonomy-supportive way, students are more likely to perceive the utility message within the rationale as a conduit for autonomy support. That is, students are likely to view the purpose—the functional significance (Deci & Ryan, 1991)—of the rationale as an external contingency intended to support their autonomy. If the same rationale were not delivered in an autonomy-supportive way, then it would not be expected to facilitate autonomy and hence identified regulation. The present study did not test this later assertion, but previous work by Deci and his colleagues (1994) shows that when rationales are presented in controlling ways, they fail to engender engagement-fostering benefits.

The provision of an externally provided rationale gives teachers an instructional strategy capable of fostering autonomous motivation, engagement, and subsequent learning during those lessons that teachers expect students might find relatively uninteresting. Being an external contingency, the rationale promotes extrinsic motivation but does so in a way that supports congruence between students' subjective feelings and their behavior directed toward the task. Most extrinsically motivating instructional strategies, such as extrinsic rewards, typically induce students into a compliance mode that places their subjective feelings ("this is boring") at odds with their engagement behavior (Joussemet, Koestner, Lekes, & Landry, 2005). Extrinsically motivating instructional strategies enhance engagement best when they allow harmony or congruence between students' inner motivational resources ("I want to do this") and their task engagement (spending 20 min studying the lesson). The externally provided rationale used in the present study worked as an effective extrinsically motivating strategy because it allowed students' experience of autonomous motivation (perceived importance, perceived autonomy) to be the motivational foundation that determined the extent of their task engagement and subsequent learning.

Implications for Subjective Task Values

Value researchers emphasize three major contributors to (or components within) subjective task value: (a) extrinsic utility value, which is a task's perceived usefulness in accomplishing some desired end state, such as a career goal; (b) interest value, which is the task's perceived capacity to generate a sense of enjoyment; and (c) attainment value, which is a task's sense of importance to the individual's underlying self-system (Eccles & Wigfield, 1995).[2] Because this research has relied almost exclusively on nonexperimental survey-based research, the teacher's potential role in enhancing students' valuing of classroom activities has been largely unexplored (as researchers typically examine how privately held values correlate with task choices, such as whether or not to take a math class; Meece, Wigfield, & Eccles, 1990). The present findings therefore can potentially offer some unique insights into the process in which educators attempt to transfer objective task value (what the school values) to subjective task value (what the student values; Eccles & Wigfield, 1995).

Translating these three contributors to subjective task value into the concepts featured in the present experimental research aligns extrinsic utility value with the contents of the externally provided

[2] In addition to these three contributors, additional components, such as costs, subject matter appreciation, and/or future goals, are also possible contributors to subjective task value (Brophy, 1999; Husman & Lens, 1999; Miller & Brickman, 2004; Wigfield & Eccles, 1992).

rationale, interest value with interest regulation, and attainment value with identified regulation. To the extent that these concepts are interchangeable, three insights emerge in regard to the educational effort to promote students' subjective task value during uninteresting academic lessons.

First, the effort to directly communicate a task's extrinsic utility value to students can be expected to fail more often than not. This skepticism stems from previous rationale-based research showing that externally provided rationales that communicate only a task's extrinsic utility value fail to promote either internalization or engagement in their recipients (Deci et al., 1994; Reeve et al., 2002). Before the extrinsic utility value information contained within a teacher-communicated rationale can be expected to promote either internalization or engagement, it first needs to be embedded within an autonomy-supportive communication style—one that takes the perspective of students, acknowledges their negative feelings, and relies on informational language. To the extent that teachers do not make the instructional effort to help students find personally meaningful connections between their own goals, values, and sense of self and the classroom's uninteresting learning activities, the extrinsic utility value information within a rationale will likely generate only external regulation (not engagement-fostering identified regulation, which is autonomous extrinsic motivation; Reeve et al., 2002). Second, attainment value lies fully within the eyes of the student—in the student's sense of self. Hence, teacher-initiated instructional strategies to promote students' attainment value toward an uninteresting task make little sense. Instead, the most promising engagement-fostering instructional strategy during an uninteresting task appears to be to blend high awareness of what students already value with externally provided rationales to explain the interrelationship between the student's sense of self and the utility value offered by the task. Such an approach characterizes the independent variable used in the present study—namely, using an autonomy-supportive communication style to explain the task's extrinsic utility value to the student's sense of self (as a prospective teacher). This conclusion has potential application not only for promoting value in uninteresting lessons but also for promoting valuing in students' long-term future goals as well (Husman & Lens, 1999; Miller & Brickman, 2004). That is, the effort to promote another's active engagement toward a long-term future goal likely requires both autonomy support to foster self-determined attainment value and explanatory rationales to promote a specific activity's utility value. Third, the findings show a surprising lack of support for the instructional effort to promote interest value during uninteresting activities. Under circumstances in which students are very likely to be extrinsically motivated—because the task itself cannot provide the inherent satisfactions students need to experience intrinsic motivation—IESs were unable to generate the type of motivation students needed to freely engage in and learn from the deeply uninteresting lesson they faced. When tasks are deeply uninteresting, providing rationales in an autonomy-supportive way to promote identified regulation seems to be the more promising engagement-fostering strategy.

Future Research

The findings point to a number of potentially fruitful areas for future research. Rationales produce positive motivational benefits because they help students perceive the otherwise hidden utility within the uninteresting activity, such as the capacity of the activity to help them develop an important skill. In practice, then, teachers need to communicate to students how they can benefit from the uninteresting tasks that are assigned to them. One question for future research is the extent to which teachers actually attempt to do this. It remains to be studied whether teachers generate the sort of rationales that their students will accept and internalize. Another question to ask is how successful teachers typically are in helping their students internalize the externally provided rationales they hear into self-endorsed reasons of their own. Another question to ask is what qualities of a rationale are most likely to help students accept it as their own. In other words, what qualities allow some rationales to be perceived as convincing and satisfying whereas other rationales are perceived as bogus, empty, or even manipulative? Still another question to ask is whether the effectiveness of a rationale depends somewhat on students' preexisting identified regulation toward the type of activity that includes the target activity. Can a teacher provide an otherwise amotivated student with a convincing and satisfying rationale and see that student begin to experience some level of identified regulation toward that task? Or, does the effectiveness of an externally provided rationale depend on the presence of some preexisting amount of students' identified regulation in that area of study?

Another question for future research is to explore students' capacity to self-generate rationales. It is not at all clear how rare or how commonplace the practice of self-generating a rationale is during academic lessons. It is also an unanswered question whether student-generated rationales might be more motivationally productive than teachers' externally supplied rationales. On the one hand, student-generated rationales would supposedly be richly embedded within their high identified regulation toward the lesson, whereas, on the other hand, a teacher's externally generated rationale would have the advantage and insight of an experienced expert as to what hidden use underlies the enactment of the uninteresting task.

It is also worth clarifying what interest regulation during an uninteresting task is not. IESs to regulate one's interest are not strategies to escape from or avoid uninteresting tasks. An IES does not, for instance, take the student away from the academic task and toward a substitute (and more interesting) alternative, such as daydreaming (off-task IESs). Time spent daydreaming would lower the student's on-task engagement for the academic assignment and hence decrease learning, performance, or skill development. This is why the inclusion of the currently absent behavioral measures of engagement and measures of learning or performance are so important in the conduct of interest regulation research. Future research on interest regulation needs to show that the IES does not undermine performance. Instead, an academically worthwhile IES is one in which the activity to be done remains the same—read the 200-page book, complete the 20 homework questions, or learn the periodic table. What changes is not the lesson but the students' interest while engaged in the lesson. Students have the capacity to create and use IESs, and, in doing so, they experience the benefit of positive emotion and subjective well-being. Future research on interest regulation and IESs might perhaps reveal additional benefits of these strategies. For instance, the large covariation between identified regulation and interest regu-

lation (see Table 2 and Figure 5) raises the possibility that interest regulation, like the provision of a rationale, might function as a facilitating path to enhanced internalization and identified regulation. In pursuing such a research question, future research might investigate the theoretical and conceptual link between IESs and subsequent identified regulation.

A next step in this line of research is to test these hypothesized models using classroom teachers communicating with students, parents communicating with their children, and school counselors communicating with students. In these naturalistic settings, many different rationales are communicated, which raises the question, "What constitutes an effective rationale?" In the present study, I designed the rationale to facilitate two correlated effects: (a) enable the participant to perceive the activity as important enough to become worth one's effort and (b) help the participant make a connection between the activity and a personal goal (i.e., gaining a useful skill in the present study). In this same spirit, Deci and his colleagues (1994) conceptualized an effective rationale as that which is personally meaningful. The phrase "personally meaningful" nicely captures the experience that lies at the intersection of perceived autonomy and perceived importance.

Limitations

The primary limitation of the present study was that it was not carried out within the context of an on-going classroom environment. Because the rationale was communicated in a written form (to control for extraneous factors), there was no interpersonal relationship between the rationale provider (e.g., a teacher) and its recipients (e.g., students). Within the context of an on-going interpersonal relationship, each of the following qualities in the teacher trying to motivate students has been found to contribute positively to the students' willingness to accept (i.e., internalize) the communicated rationale: warmth (Goodenow, 1993; Midgley, Feldlaufer, & Eccles, 1989), involvement (Skinner & Belmont, 1993), and interpersonal relatedness (Ryan & Powelson, 1991). Presumably, providing a rationale within the context of a warm, caring relationship would produce a stronger effect on students' motivational processes. Thus, the effects obtained in the present study probably underestimate the motivation-enhancing possibilities of teacher-provided explanatory rationales. To test whether this is so, additional research in actual classroom settings is needed. In addition, because only college-age students were used, the applicability of these findings to the younger grade school children remains untested.

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