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Supporting Autonomy in the Classroom: Ways Teachers Encourage Student Decision Making and Ownership

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In addition to classroom activities, teachers provide personal and instructional supports meant to facilitate the developing sense of student autonomy. In this article, we offer a way of thinking about autonomy-supportive practices that suggests that such practices can be distinguished at a featural level and that different practices may in fact have different outcomes in terms of student classroom behavior. Specifically, we propose that autonomy support can be manifested in the classroom in at least 3 distinct ways: *organizational* autonomy support (e.g., allowing students some decision-making role in terms of classroom management issues), *procedural* autonomy support (e.g., offering students choices about the use of different media to present ideas), and *cognitive* autonomy support (e.g., affording opportunities for students to evaluate work from a self-referent standard). We offer vignettes of teachers in their classes to illustrate our proposition that autonomy support may be carried out on several planes and may produce different outcomes. Whereas organizational autonomy support may encourage a sense of well-being and comfort with the way a classroom functions and procedural autonomy support may encourage initial engagement with learning activities, cognitive autonomy support may foster a more enduring psychological investment in deep-level thinking.

Engagement is critical for academic learning (Turner, Meyer, Cox, Logan, DiCintio, & Thomas, 1998), and it is widely held that motivation and cognition are key determinants of student engagement in school (e.g., Deci & Ryan, 1987; Pintrich, Marx, & Boyle, 1993; Skinner, Wellborn, & Connell, 1990). It is also recognized that what teachers do and say can have powerful and pervasive effects on students' intentions for learning, subsequent learning behaviors, and academic engagement. Student perceptions of classroom instruction are highly associated with the motivational beliefs and behaviors students embrace (Ames, 1992; Maehr & Midgley, 1996; Stipek & Gralinski, 1996; Turner et al., 2002). Pintrich (2000) described this relationship in the following way:

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> Goals are assumed to be cognitive representations or knowledge structures, which are sensitive to both contextual and internal personal factors ... Accordingly, strong classroom contexts or experimental manipulations (where the context defines the situation and appropriate behavior in many ways) can influence individuals to activate different goals than the ones they would normally or chronically access. (p. 102)

In line with the reasoning of the interplay between self and context, self-determination theory recommends that we examine authority structures in instruction and realign those authority structures to support student autonomy (Deci & Ryan, 1987; Ryan & Deci, 2000). *Autonomy*, according to Deci and Ryan (1987), can be defined as "action that is chosen; action for which one is responsible" (p. 1025). *Supporting autonomy* refers to the idea

> that an individual in a position of authority (e.g., an instructor) takes the other's (e.g., a student's) perspective, acknowledges the other's feelings, and provides the other with pertinent information and opportunities for choice, while minimizing the use of pressures and demands. (Black & Deci, 2000, p. 742)

Deci and Ryan (1994) posited that, for students to be self-determined, they must have their psychological needs of autonomy, competence, and relatedness fulfilled in social contexts. Learning itself has an autonomous nature. Recent advances in cognitive learning theory reveal that learning is an active, self-constructed, and intentional process (Bereiter & Scardamalia, 1989; Lambert & McCombs, 1998; Sinatra, 2000). However, misconceptions exist among teachers and parents about the role of autonomy in the classroom (Boggiano & Katz, 1991). Although autonomy has been found to promote more persistence on tasks and increase self-regulation for learning, many principals, parents, and teachers continue to support the use of controlling strategies in classrooms (deCharms, 1968; Deci & Ryan, 1987).

Our goal is to understand the distinguishing features of autonomy support as it is implemented in practice. In this respect, the ideas presented here are meant as theoretical propositions resulting from observations of teachers, their instructional strategies, and the language they used to support student autonomy. We offer the following theoretical propositions, supported by past research and vignettes from our own observations, as a way to initiate a discussion about those features of autonomy support that result in enduring psychological effects on student engagement in learning. This article adds to a growing literature that takes a closer look at the actual practices our teachers engage in (e.g., Reeve, Bolt, & Cai, 1999, Turner et al., 1998; Turner et al., 2002) and attempts to understand the implications those practices may have for student motivation. As Patrick, Anderman, Ryan, Edelin, and Midgley (2001) indicated, much of what we know about motivation and perceptions of classroom environments comes as a result of survey data. There is a recognized need for studies that provide rich details from the classroom to help expand our understanding of the relationships between student motivation, how such motivation is expressed, and instructional practices.

The process of studying theory through the lens of practice helps us refine our theoretical constructs, making them more valid representations of the constructs they seek to explain. Ames (1992) discussed the paucity of research in the area of how students perceive and react to autonomy structures in the classroom. Furthermore, Skinner and Belmont (1993) stressed that researchers must investigate the source of differences among teachers in their provision of autonomy support. Although the body of research describing actual classroom practices is growing, there remains a pressing need for continued investigations that describe teacher's practices through the lens of theory (e.g., Patrick et al., 2001). It is as a result of our observations of classroom instruction that we propose that autonomy support may be carried out in several different ways and that each has distinct features that may affect student behavior in different ways. We offer our observations and descriptions of teachers' instructional practices, as well as support from previous research, to develop this idea.

AUTONOMY SUPPORT FROM A THEORETICAL PERSPECTIVE

Early on, deCharms (1968) asserted that perceived control could be explained as an individual's feeling of being either an origin or a pawn. He defined an *origin* as "a person who perceives his or her behavior as determined by his own choosing" and a *pawn* as "a person who perceives his or her behavior as determined by external forces beyond his control" (pp. 273–274). Origins engage in setting realistic goals, determining appropriate actions that accomplish goals, and assessing progress toward the goals (deCharms, 1968, 1976). In contrast, pawns feel controlled by the external events in the environment and thus lack volitional strategies and behaviors.

Deci and Ryan (1985) extended the discussion of perceived control from that of the dichotomy of origins and pawns to a continuum ranging from those who perceive themselves to engage in autonomous, self-determined actions to those who believe their actions to be externally controlled. Based on extensive interviews, five categories emerged describing reasons why students endorsed engagement in achievement behaviors (Ryan & Connell, 1989). The categories include external regulation, introjected regulation, identified regulation, integrated regulation, and internal regulation (intrinsic motivation). These gradations of students' experiences form a theory of internalization, which states that the more internally valued and regulated a behavior is, the more it is experienced as autonomous (Deci & Ryan, 1985; Ryan & Deci, 2000).

Intrinsically motivated behaviors are performed out of interest and enjoyment of the activity for its own sake. There are no external controls or separable consequences linked with intrinsic motivation. According to Deci and Ryan (1985), this represents the most autonomous and self-determined behavior because it is completely volitional and emanates from the person's sense of self. However, this is not to say that extrinsically controlled behaviors cannot become self-determined. Through the process of internalization, students can come to transform externally regulated behaviors into internally regulated behaviors.

CLASSROOM CONTEXTS SUPPORT AUTONOMY

The self-system process has been described in terms of three human needs that are necessary components for optimal learning: competence, relatedness, and autonomy (Deci, 1980; Deci & Ryan, 1987). In the context of the classroom, the need for *competence* characterizes students' need to understand their schoolwork. *Relatedness* involves students' need for belonging, personal support, and security in their school relationships. Lastly, *autonomy* involves students' need for latitude over decisions in school with regard to the "initiation, inhibition, maintenance, and redirection of activities" (Connell, 1990, p. 65).

Classroom contexts can either facilitate or frustrate these psychological needs (Deci & Ryan, 1985; Guay & Vallerand, 1997). According to self-regulation theory, the degree to which students perceive the classroom tasks and events as facilitating those needs determines engagement in learning. Different classroom structures facilitate each of these three needs; however, autonomy is thought to be best supported through the provision of choice and the removal of external controls, such as pressures or rewards (Deci & Ryan, 1994).

Several characteristics of classroom contexts support self-determination (Deci, Vallerand, Pelleiter, & Ryan, 1991), including amount of choice and positive feedback regarding competence. These strategies have been shown to increase student perceptions of control and direct the regulation of academic activities in support of responsibility and persistence. On the other hand, threats, deadlines, and some forms of evaluation and surveillance have negative effects on student self-determination (Deci & Ryan, 1987). Indeed, "the more we try to control and pressure learning from without, the more we obstruct the tendencies of students to be actively involved and to participate in their own education" (Ryan & Stiller, 1991, p. 117). Clearly, the goal for educators is to create and foster classrooms that support students in becoming truly autonomous or self-determined as learners. Identifying what those practices might be that differentially affect students autonomy is critical.

AUTHORITARIAN VERSES SUPPORTIVE CONTROL

Classrooms vary widely in the ways they support student autonomy (deCharms, 1976; Ryan & Grolnick, 1986). Early studies investigated the influence of adult control patterns on children's behaviors. In their classic study, Lewin, Lippitt, and White (1939) found that a democratic leadership style influenced student motivation, participation, and completion of work by creating an atmosphere in which students persisted and were productive in the absence of the leader. Whereas the boys in the authoritarian leadership group, although persistent, sensed tension and heightened anxiety.

Since the Lewin et al. (1939) study, other researchers have examined the differences between authoritarian and democratic environments (e.g., Boggiano & Katz, 1991; Deci, Schwartz, Sheinman, & Ryan, 1981; Grolnick & Ryan, 1989; Skinner & Belmont, 1993; Weinert & Helmke, 1995). A considerable body of research shows strong evidence that controlling environments contribute to low achievement, anxiety, preference for easy work, and dependence on others to evaluate their work (e.g., Boggiano & Katz, 1991). Likewise, significant relationships have been found between autonomy support and a number of positive outcomes. These positive outcomes include intrinsic motivation (Zuckerman, Porac, Lathin, Smith, & Deci, 1978), preference for optimally difficult work (Harter, 1978), striving for conceptual understanding (Grolnick & Ryan, 1989), a sense of enjoyment and vitality (Ryan & Deci, 2000), and perceived competence (Cordova & Lepper, 1996).

WHAT EXACTLY DO AUTONOMY-SUPPORTIVE TEACHERS DO?

Reeve et al. (1999) were able to categorize teachers as high or low in autonomy support and made several interesting findings. Teachers high in autonomy support listened to the students more often and allowed students to handle and manipulate the instructional materials and ideas more often than those teachers categorized as low autonomy-supportive. With regard to discourse, autonomy-supportive teachers were more likely to ask about student wants, respond to student-generated questions, and volunteer perspective taking statements meant to relay to the student the teacher's understanding of the student's emotional state. Autonomy-supportive teachers were less likely to give solutions or use directives. Furthermore, Reeve et al. found differences in how high and low autonomy-supportive teachers attempted to motivate disengaged students. Compared with their controlling counterparts, autonomy-supportive teachers described specific attempts to support intrinsic motivation, such as creating a student-centered atmosphere, encouraging student initiative, nurturing competence, and using noncontrolling communication, as well as attempts to promote internaliza-

tion by providing rationales and promoting the valuing of the task.

Assor, Kaplan, and Roth (2002) reported similar findings regarding the saliency of teacher supports for autonomy. They distinguished between three types of teacher autonomy-supportive behaviors: (a) fostering relevance by articulating the role of the learning activity in relation to the student's personal goals, (b) allowing the expression of student dissatisfaction with learning tasks to cause the teacher to rethink the learning activity, and (c) providing students with opportunities to choose tasks consistent with personal goals and interests. Assor et al. questioned the students and found that the most important predictors of student autonomy are the fostering of relevance and the suppression of criticism. Of interest, and in line with the points being made here, is the finding that providing choice about learning tasks (what we refer to as procedural autonomy support) had little impact on student perceptions of autonomy or on self-reported behaviors and cognitive engagement.

Research indicates that under authoritarian control, learning activities may indeed be so constrained that students attempt to reproduce information from teachers as passive recipients and attempt to complete work even when they lack understanding. In contrast, under supportive control, students express their desires and become co-decision makers in the learning process, due in part to the fact that autonomy-supportive teachers demonstrate more enthusiasm and activity in seeking student's initiative than their controlling counterparts (Reeve et al., 1999).

AUTONOMY-SUPPORTIVE PRACTICES SUPPORT MOTIVATION AND ACHIEVEMENT

Autonomy support benefits achievement and motivation (Deci, Nezdik, & Sheinman, 1981; Miserandino, 1996; Weinert & Helmke, 1995). In a longitudinal study of first to fourth graders, Weinert and Helmke found a positive relationship between autonomy support and achievement in mathematics. Also, autonomy support in the classroom was significantly related to positive attitudes toward learning and on-task behavior. Deci et al. found that teacher orientation toward autonomy support increased perceived competence and mastery motivation among students. Children in the upper elementary grades reported higher levels of intrinsic motivation in environments where autonomy was supported and encouraged. Miserandino found that students who perceived themselves as competent and autonomous were more curious, more persistent, more involved, and reported enjoying schoolwork more than students who reported low competence beliefs and low autonomy.

It is clear that positive outcomes accrue in autonomy-supportive environments. What is not as clear are the multiple ways autonomy support is actualized in classrooms and whether positive student outcomes vary with the mechanism of support utilized. Although this article does not offer objective data relating to student outcomes in either learning or motivation, we do offer examples of different ways teachers operationalize autonomy support in their classrooms and provide examples of student behavior and statements that may indicate that different autonomy-supportive practices produce different types of student engagement in learning.

AUTONOMY SUPPORT: A SHIFT IN PERSPECTIVE

Many researchers characterize *autonomy support* as the provision of (a) latitude and decision making (Skinner & Belmont, 1993), (b) rationales for the value of learning in a noncoercive environment (Reeve et al., 1999), (c) clarifying the relevance of the learning (Skinner & Belmont, 1993), and (d) positive feedback about competence (Deci et al., 1991). However, when translated into teaching practices, it seems that autonomy support has become synonymous merely with choice. Worse yet, in practice, meaningless choice is often embraced while opportunities for academically significant choices are limited. For example, autonomy support is most often embodied in the classroom through offers for students to negotiate assignments regarding organization or procedure. In a study of personalization and choice among 4th- and 5th-grade math students, Cordova and Lepper (1996) noted, "we offered students choices over only instructionally irrelevant aspects of the learning activity ... [we did not want to run] the risk that students might make pedagogically poor choices if allowed to determine instructionally crucial aspects of the activity" (p. 716). Assor et al. (2002) provided us with evidence that the impact of providing these types of choices to students is minimal with regard to self-reports of autonomy and cognitive engagement. We further argue that the dominant view of autonomy support as one of offering choice may be too confining. Rather, we contend that autonomy is better thought of from a more inclusive standpoint that includes cognitive choices as well as organizational and procedural choices. In other words, organizational and procedural choice may be necessary but not sufficient conditions for deep-level student engagement in learning.

A fresh look at autonomy support from an observational perspective may reveal a deeper understanding of the implications of its implementation in the classroom context. For instance, the strategy of allowing student choice about task materials may be sufficient for providing initial feelings of control, but it may not insure the long-lasting effects that educators seek to promote. Moreover, although theory embraces the importance of self-determination, the recommendations for implementing autonomy support seem to invariably resort to surface types of strategies, such as the choice of a partner with whom to work. We suggest that a broader view of autonomy support that captures a kind of support that encourages cognitive autonomy may be the es-

sential link to increasing not only short-lived involvement, but enduring motivation and engagement.

We define three distinct features of autonomy support that are represented in Table 1. The first set of features characterizes what we have called organizational autonomy support. Organizational autonomy support encourages student ownership of environment and can include teacher behaviors that offer students opportunities for choice over environmental procedures, such as developing rules together, or latitude over rate of progress toward a goal, such as selecting due dates for assignments. The second set of features characterizes what we have called procedural autonomy support. Procedural autonomy support encourages student ownership of form and can include teacher behaviors such as offering students choice of media to present ideas—for instance, making a graph or picture to illustrate a science concept. The third set of features characterizes what we have called cognitive autonomy support. Cognitive autonomy support encourages student ownership of the learning and can include teacher behaviors such as asking students to justify or argue for their point, asking students to generate their own solution paths, or asking students to evaluate their own and others' solutions or ideas (Logan, DiCintio, Cox, & Turner, 1995). We further suggest that it is cognitive autonomy support that truly leads to the psychological investment in learning that educators strive for. We describe learning environments where support for the various configurations of organizational, procedural, and cognitive autonomy were manifested. We also refer the reader to previous work done on issues of autonomy support and suggest that the findings and implications from those studies support the issues raised here.

Specifically, according to Reeve et al. (1999), intrinsic motivation and internalization are key areas in which autonomy-supportive teachers focus attention. "Conceptually, autonomy support revolves around the teacher's effort to identify and support students' interests and volitional internalization of the school's values and agenda" (Reeve et al., 1999, p. 547). We are suggesting that, although clearly student interest is key when one considers determinants of persistence, it may be that interest develops as a result of interactions with learning tasks that have been structured in such a way as to promote engagement rather than as the precursor to engagement. In other words, relying on student interest to propel a student toward being intrinsically motivated and engaging at a deep and meaningful level with academic tasks may not be the most effective approach. Typical mechanisms to engage interest include organizational and procedural embellishments and choices. This type of engagement with learning may be a short-lived engagement.

In addition, Assor et al. (2002) concluded regarding the relative importance of choice versus relevance in autonomy-supportive practices that

> In our view of the need for autonomy, the role of freedom of action is less important than the extent to which one's actions reflect one's personal goals, interests or values. Freedom of action is, of course, desirable, because it often increases the likelihood that people will be able to realize their personal goals and interests in their actions, but it is not the primary component of the need for autonomy. (pp. 272–273)

We are suggesting that autonomy-supportive practices that articulate the relevance of learning tasks to students' personal goals may in fact be secondary to autonomy-supportive practices that allow students to explore ideas in ways that suggest that students can use their unique ways of problem solving to make meaningful conclusions. Those conclusions may be about the relevance of such learning tasks to their own personal goals, but they may also be about the inherent nature of

TABLE 1
Strategies Associated With the Different Features of Autonomy Support

Organizational Autonomy Support	*Procedural Autonomy Support*	*Cognitive Autonomy Support*
Students are given opportunities to:	Students are given opportunities to:	Students are given opportunities to:
Choose group members	Choose materials to use in class projects	Discuss multiple approaches and strategies
Choose evaluation procedure	Choose the way competence will be demonstrated	Find multiple solutions to problems
Take responsibility of due dates for assignments	Display work in an individual manner	Justify solutions for the purpose of sharing expertise
Participate in creating and implementing classroom rules	Discuss their wants	Have ample time for decision making
Choose seating arrangement	Handle materials	Be independent problem solvers with scaffolding
		Re-evaluate errors
		Receive informational feedback
		Formulate personal goals or realign task to correspond with interest
		Debate ideas freely
		Have less teacher talk time; more teacher listening time
		Ask questions

the meaningfulness of the topic under study in its own right. When this happens, students can be said to be engaging in learning for learning's sake, when their drive is simply to understand and not necessarily to need a personally relevant reason for understanding. The importance of relevance to personal goals is undeniable in its effects on engagement. However, the distinction being made here is that one might see this as the difference between intrinsic motivation and integrated regulation, the most self-determined form of extrinsic motivation (Deci & Ryan, 1985; Ryan & Deci, 2000).

EXAMPLES OF THE PROPOSITION

Our proposition is made on the basis of pre-existing literature on autonomy support and self-determination and is illustrated primarily through the observations of seven 5th- and 6th-grade classroom teachers in a mostly White, middle-class, rural school district in the northeastern region of the United States. These teachers were part of an 8-month long investigation into student involvement and instructional practices.

Naturalistic observational data were collected on the 5th- and 6th-grade classrooms using audio tapes of 84 mathematics lessons and an observation instrument (Turner et al., 1998). We audio-taped each observed lesson to provide detailed accounts of the instructional and motivational strategies utilized. Audio-taped lessons were transcribed verbatim so as not to lose the unique quality of each teacher's style of discourse.

As the team reflected on and examined instances of implementation of autonomy support as derived from the theory-driven definition, we began to formulate that our a priori definition of autonomy support did not capture the construct in ways we saw unfolding. Whereas the autonomy literature suggests teaching practices that tend to reflect high levels of autonomy support, we observed manifestations of this construct in practice that appeared to provide counterintuitive results in terms of student behavior. For example, some lessons appeared low in autonomy support, in that there was very little room for negotiation of task or timing, for example. However, in these same lessons, what we watched was students engaged in self-motivated scholarship and generation of ideas. In direct contrast to our observational definition, the student-centeredness observed in these low autonomy support lessons resulted in the type of student behavior that would be expected under conditions that support and encourage autonomy. Conversely, in classrooms where there was a high degree of what are generally considered autonomy-supportive practices, practices such as allowing for student choice about task or procedure, we observed very little student engagement beyond engagement on the surface level. It was because of these observations that the team began discussing the possibility of the distortion of autonomy support in practice, because the full implication was not being extracted from the theoretical definition. Through the procedures of coding, categorizing, noting themes, and comparing and contrasting instructional elements, we concluded that there was evidence to support the existence of qualitatively different characteristics of autonomy support. Much like Assor et al. (2002), we found that autonomy support can be distinguished on the basis of several different features. Assor et al. distinguished autonomy support on the basis of (a) offering choice, (b) offering explanations of relevance, and (c) offering opportunities for students to express concerns regarding the efficacy of the learning tasks. We distinguish autonomy support on the basis of choice alone, with choice having qualitatively different features: organizational choice, procedural choice, and cognitive choice.

Instances of organizational autonomy support were relatively straightforward to identify. Identification of the features of this type of autonomy support centered on teacher statements that indicated a sharing of procedural decision-making responsibilities. For example, allowances for the choice of cooperative partners in group work scenarios or choice of due dates for assignments are statements identified as offering organizational autonomy support . Furthermore, instances of procedural autonomy support were seen by teacher statements that allowed students to make decisions about the form of the output of learning. For instance, permission to choose the presentation style for a product or permission to choose among projects for a given learning objective are illustrative of procedural autonomy support.

Identification of instances of cognitive autonomy support required a somewhat more careful analysis of teacher statements that created the conditions for students to become initiators of their own academic pursuits. Instances of instruction and teacher discourse that required students to justify strategy choice, understand their own thinking or solution path, use multiple approaches to tasks, or teacher declarations of appreciation for unanticipated solutions were seen as evidence of cognitive autonomy support.

In the following discussion, we describe four lessons from our own observations that were categorized as (a) low in organizational, procedural, and cognitive autonomy support; (b) high in organizational and/or procedural but low in cognitive autonomy support; (c) high in organizational and/or procedural and high in cognitive autonomy support; and (d) low in organizational and procedural but high in cognitive autonomy support.

LOW ORGANIZATIONAL AND/OR PROCEDURAL/LOW COGNITIVE AUTONOMY SUPPORT

The following is a description of a lesson that was coded low in organizational, procedural, and cognitive autonomy support. Ms. Ford began a measurement lesson with her low-ability class by reviewing meter, centimeter, and millimeter conversions on the overhead projector. The students

were told to copy the overhead notes onto their worksheets entitled, "Measurement Study Sheet."

> Ms. Ford: What I need you to do is follow along as I read the information on page 172. We are studying information on equal measurement involving centimeters, millimeters, meters ... The "m" equals meter—boys and girls, please remember this, write it on your study sheet right now ... I apologize if this is review but I want to make sure that you have this on paper so that you know it for the quiz.

During this lesson, the teacher did not allow any opportunities for organizational or procedural autonomy. That is, the teacher directed the student behaviors and made decisions about each aspect of lesson implementation.

> Ms. Ford: Here is a perfect example of what I was trying to explain to you. If you're given centimeters and you want to find meter, all you have to do is move the decimal ... write this on your paper ... write this, this is simply memorizing the pattern.

This type of product-oriented instruction, in addition to allowing students no room for organizational or procedural choice, offered limited opportunities for students to think independently. Furthermore, the instruction neglected to conceptually explain the process of converting measures of the metric system. Rather, it focused on the rote element of moving decimals for conversion purposes. As the lesson drew to an end, Ms. Ford assigned the task of measuring five objects using millimeters. Next, the students were asked to convert the measures into centimeters and meters. This lesson appeared to be lacking in both levels of autonomy, with students being given no opportunity to ask questions or explain their own understanding.

HIGH ORGANIZATIONAL AND/OR PROCEDURAL/LOW COGNITIVE AUTONOMY SUPPORT

Ms. Carey's style of teaching provided many opportunities for her group of high-ability students in terms of organizational and procedural autonomy. For example, the students were permitted to hand in homework for a lesson any time before the lesson test. This provided opportunity for students to control due dates. Furthermore, this teacher often engaged the students in discussions about the implementation of procedures. Ms. Carey frequently asked, "What should we be doing ...?" or "Should we do ...?" The students also contributed ideas about process, "Can we do ...?"

The following description portrays the teacher and students collaborating on a percentage project. During the first part of this lesson, students worked in collaborative groups filling in a chart model created by the teacher, "This is my sample for you. It is a model. You will be creating your own personal percentage project."

The project required students to first, predict the percentages of different flavors of candy in a bag; second, calculate the percentage of different flavors accounted for; and third, convert the percentages to decimals and fractions. Follow-up questions included having students find the difference between their predicted and actual values and mark the changes that would occur if a new flavor were added to the chart without changing the total.

In the second part of the lesson, the students created their own project. The teacher invited students to choose different objects to make up percentage problems, create their own charts, and design their own follow-up questions. While maintaining a mathematical focus, Ms. Carey gave students a substantial amount of freedom in navigating through the process and emphasized the creativity expected in solutions.

> Ms. Carey: It needs to have neat, colorful decorations ... Please, let's make this a little bit fun and creative. I am requiring all different operations, including algebra, prediction and actual, but make it fun or even funny questions (in reference to the follow-up questions).

In terms of organizational and procedural autonomy, it appeared that Ms. Carey struck a comfortable balance between teacher control and boundary setting and allowing for student autonomy and decision making. One interesting finding from the outcomes of the percentage project was that, despite all of the requests from the teacher for creativity and personal thinking on the follow-up questions, the students mostly imitated the original five questions from the model project. They did not, or could not, accept the opportunity for cognitive autonomy. This is an interesting point and one to which we return later.

LOW ORGANIZATIONAL AND PROCEDURAL/HIGH COGNITIVE AUTONOMY SUPPORT

Ms. Benjamin's high-ability classroom was characterized by a high degree of teacher control over routines and activities. That is, she decided which activities would be implemented, whether group work was a component in the plan, and if so, the composition of group members. Furthermore, if the lesson was designed to be carried out as a project embedded within a context, the teacher directed all the materials, procedures, and flow of the lesson.

However, the one element that was left completely under student control was the actual thinking during the assignment. Ms. Benjamin always required students to be effortful in their mathematical reasoning when working through prob-

lems. For example, Ms. Benjamin routinely expressed admiration for the variety of solution processes that were attempted by students. She would say, "I just love that" or "That's really neat, do you all see what he/she did here?" or "Here's the really neat part."

On occasion, Ms. Benjamin would come across a student who demonstrated an unanticipated path to a solution. At these times, she assumed a learner's role by soliciting information about the details of the process used. This strategy was effective in showing students that she was not the sole authority on mathematical solution processes, but that she and they were coinvestigators of, or coinquisitors into, these processes.

One lesson that expressly demonstrated cognitive autonomy support asked students to fill in three different charts on the blackboard: one for decimal to percentage conversion, another for fraction to percentage conversion, and the last for percentage to fraction conversion. The lesson design contained no evidence of organizational and/or procedural autonomy support.

However, Ms. Benjamin immediately wanted to know what and how the students were thinking: "How do you deal with switching back and forth between decimals and percents? It is real easy just to say move the decimal point two spots. What does that mean? What is the significance of the two spots?" As the class reviewed the solutions, Ms. Benjamin encouraged and valued the application of different strategies in the conversion process.

> Ms. Benjamin: Who can tell me—here's another way; I don't know, maybe one of you approached it like this—how can I change this to a decimal and then transfer from decimal to percentage? This might be the way I would approach it. Who can change this (5/8) to a decimal? How would you do it? Think about that for a minute. Because we can use these for our advantage. If we know how to do one, we can convert to another ... There are many, many ways that you can get these conversions ... as long as you're thinking through in a mathematical strategy that is correct, you're going to come up with the right answer.

Most important, unlike Ms. Carey's classroom where the students did not respond to the teacher's encouragement, the students in Ms. Benjamin's classroom offered many different strategies or different ways of thinking. They had little control over the task, but a great deal of control over how to think about their academic tasks. The benefits of this approach were revealed when students enthusiastically continued listening and sharing ideas far beyond the lesson's allotted time. Often, Ms. Benjamin found it difficult to move on to the next topic because of the students' eager engagement. She would say, "OK, we've spent entirely too much time on this." The students would sigh, and Ms. Benjamin would agree to listen to a few more strategies.

HIGH ORGANIZATIONAL AND PROCEDURAL/HIGH COGNITIVE AUTONOMY SUPPORT

Ms. Adam's style of teaching was unique in that it provided students with opportunities to choose tasks on a structural level in addition to supporting cognitive autonomy. In supporting organizational autonomy, Ms. Adam encouraged her average-ability students to make decisions about whether to collaborate with peers. On any given day, some students selected partners, whereas others worked independently. The teacher also prompted students to make decisions about the processes and products. For example, when a student asked, "Can we try a different number in that equation?," Ms. Adam easily rendered control to the students and acted on the request.

A unique feature of Ms. Adam's teaching was her ability to bridge her support of organizational, procedural, and cognitive autonomy. In terms of cognitive autonomy support, Ms. Adam required careful decision making by allowing students plenty of time to think and justify their thoughts. When presenting ideas, students were accountable for supporting thoughts with mathematical theory. Often, Ms. Adam would remark, "But, wait, here is my question then ... how does that fit into your reasoning?" Furthermore, this teacher always required the students to compare and contrast different ideas and choose the most effective method mathematically. To reinforce self-reliant thinking, Ms. Adam often enabled students to learn from their mistakes. She turned errors into learning opportunities by asking students to describe their cognitive processes aloud and reevaluate where their thinking may have become muddled.

The following is a typical lesson that highlights her support of organizational, procedural, and cognitive autonomy. On this day, students were asked to formulate the number of different combinations that could be made given eight flavors of ice cream with two and three scoops. Students needed to have sound theories and explanations to justify their approach. Supporting organizational and procedural autonomy, the teacher gave students options concerning the process and procedure:

> Ms. Adam: You know it is pretty redundant to color in all of these scoops but if you would like to, you may. I have markers and colored pencils. Also, you may work with partners or alone. It is your choice. Again, if you truly want to color, that is fine, but can anyone give me a different way they might approach this problem?

Supporting cognitive autonomy, the teacher required the students to manipulate the information and develop a theory about the process. The teacher reminded students, "Remember, every hypothesis needs to be backed up by a surrounding system and justification."

In the next part of the lesson, students explained their process and product to their classmates using the overhead pro-

jector. In addition to demonstrating their many approaches in solving the problem (e.g., coloring, charts, algorithmic equations, diagrams), students were required to agree or disagree with their classmates' approaches. What is more important, they were challenged to understand why one approach might be better than another. Ms. Adam intermittently asked questions such as, "Why might this group choose this option instead of that one?" and "Who can find the repeating pattern in this group's system?"

Of interest, all but one group of students found the solution to the problem. When this last group presented their mathematical system, they discovered that they had probably made an error. Instead of coming up with 36 scoops of ice cream like all of the other groups, this group mistakenly computed 37. During their presentation, the class quickly noticed the error. One student exclaimed, "Hey, majority rules, we all got 36 and you got 37, your answer is wrong!" The teacher expressed surprise at the logic being used.

> Ms. Adam: If you cannot find the extra pattern in their model, it looks like these girls cleverly found an extra one that no one else found. The assumption is that the girls are right and the rest of us are wrong. You must prove you are right.

With that, Ms. Adam ran down to the office to make copies of that group's overhead for students to take home and review. It was evident that Ms. Adam valued all students' ideas. She required students' sedulous attention to problems and encouraged them to become confident, self-reliant mathematical thinkers.

DISCUSSION

Autonomy-supportive practices that rely mainly on offering students opportunities for choice in procedural or organizational matters may not be powerful enough to capture important elements of motivation and achievement. Certainly there was more to autonomy support in some of these classes. In fact, in some classes, there was a tremendous amount of support for autonomous student thinking despite the fact that there was very little opportunity for students to decide much about the actual instructional activity itself or the features of the environment in which the activities took place. These observations led us to our proposal of the need to more clearly articulate the different ways that teachers support autonomy in the classroom. The vignettes provide support for the contention that autonomy support exists not only through offering students choices and opportunities for decision making about procedures and organization, but also as supporting student independence in thinking or allowing student choice in how to think.

Moreover, we suggest that organizational and procedural autonomy support may be superficially engaging, whereas cognitive autonomy support may have more long-lasting effects on engagement and motivation. This thinking is not unlike Mitchell's (1993) work on interest in the classroom. He suggested that interest had two components: catch and hold. Catch activities represent the "bells and whistles" of instruction used to attract attention. Hold activities represent instruction that engages students meaningfully in academic tasks. The catch activities lead to a superficial level of motivation, according to Mitchell, whereas the hold activities empower the students to achieve learning goals.

Drawing on this analogy, we contend that organizational and procedural autonomy support, focusing, for instance, on choice of procedures and activities, represents a catch. Cognitive autonomy support, focusing on empowering students to develop self-reliance in thinking, represents a hold. Although all are important for student motivation and achievement, we believe that supporting the hold, or cognitive autonomy, may be the salient feature of autonomy support as a motivator that leads to deeper involvement in learning and self-motivated scholarship (Brophy, 1998; Leitenen, Vaurus, Salonen, Olkinuora, & Kinnunen, 1995).

Self-determination theory points out that, although intrinsic and extrinsic motivation differ in the origins of action, there is a form of self-determined extrinsic motivation: integrated regulation (Deci & Ryan, 1985, 2000). Drawing on these categories of extrinsic regulation, we suggest that the different ways of supporting autonomy may actually lead to these different forms of extrinsic regulation. Let us assume that in high-control classrooms, where little attempt is made by the teacher to support student autonomy, we would see high degrees of external regulation, where student behaviors are regulated by overt rules and students expressed desire for rewards. This would be the least intrinsic, most extrinsic scenario. If we consider the classroom where the teacher supports student autonomy through practices that offer students choice only in organization or procedure, we might expect to see the next more internalized form of extrinsic regulation, what Deci and Ryan referred to as introjected regulation. Here the student is motivated by a desire for approval from others. There may be little attention to the understanding, with emphasis being instead on form and function of the product. When teachers offer choice in the areas least connected with the cognitive aspects of the learning objective, they may inadvertently direct student motivation to something less than an intrinsic desire to learn. Students may be more interested in the structural components and less in the cognitive components. We would see engagement, but engagement around issues of form, color, design, media, or presentation. We would expect to see minimal engagement around issues of deep understanding. Furthermore, the level of students' self-determination may remain at something less than in the situation where they are encouraged to be originators of thoughts, plans, and actions. Perhaps the Assor et al. (2002) results best illustrate the categories of identified regulation and integrated regulation. Here the student endorses behaviors as valuable, useful, and personally important because

what she is doing has relevance for her own personal interests. Assor et al. reported that choice had little impact on student autonomy. Rather, it was the "extent to which one's actions reflect one's personal goals, interests or values" (Assor et al., 2002, p. 273) that had more impact. Value, utility, and personal relevance are essential ingredients to the concept of introjected and integrated regulation. However, still we can see where engagement comes by chance—that is, by chance of the student's interest and identified relevance. Engagement happens because it will lead to something else. The learning or activity is not truly engaging in its own right. When students are supported to be autonomous cognitively—that is, when they are supported in being originators of meaningful ideas, strategies, or theories, for example—might this not be the type of autonomy support that leads to intrinsic motivation and deep-level engagement? Students can be allowed to think about things that may not have utility for them in the present moment. They can be offered opportunities to strategize in areas that have no bearing or personal relevance to them at this moment in time. From this kind of engagement, interest and relevance may develop. If relevance is a necessary condition for engagement and feelings of autonomy, does this mean that we have to postpone investigations into autonomy until such time as the student has enough experiences to know what is relevant to his future plans and interests? Assor et al. made this point when they stated about the level of import of freedom of action relative to autonomy: "In other words, being able to choose one's schoolwork may not be so important to students because none of the choices seems related to their personal goals or interests, or *because they do not have clear goals or interests* [italics added]" (p. 273). This being said, it seems that there are subtleties in our characterization of autonomy support (organizational, procedural, and cognitive autonomy support) that ought to be addressed.

Clearly, providing no opportunities for students to exercise a level of control over either their environment or their thinking will not lead easily to motivated and independent thinking. Recall the vignette of the teacher who provided the students with everything they needed to know and do in the measurement lesson on meters, centimeters, and millimeters. The students in this classroom quietly followed the teacher's directions. Compared to the other classrooms, there appeared to be very little enthusiasm and deep-level engagement.

The classroom characterized as one high in organizational and procedural autonomy support, on the other hand, appeared to engage students to a greater degree than the class low in organizational and procedural and cognitive autonomy support. For example, the tangible choices offered in Ms. Carey's classroom (i.e., homework hand-in dates, choosing what they might do in class) appeared to pique students' interest and allowed students to become involved in lessons. However, the choices—and quite likely the interest—centered on procedural decisions. When it was time to think independently about mathematical principles (e.g., create a project and follow-up questions), the students copied the format the teacher presented in her model, merely substituting words and numbers where necessary. The students were working throughout the entire lesson; however, their engagement might be characterized as being more on a superficial rather than a deep cognitive level. This teacher engineered her classroom such that students could experience the freedom that comes with choice. So why had these students chosen to mimic the teacher's thinking rather than exercise an opportunity for choice in a different way? It may be that this teacher's attempts at supporting autonomy captures very well what we defined as organizational and/or procedural autonomy support, with choice most apparent in choice about procedure and project design. However, there is little evidence that her support for student cognitive autonomy was articulated in a way that was clear to these students. It may have been her intention to encourage her students to think independently (in this case, by demonstrating their understanding of percentages) by offering them task choices. However, the students may have been bound to repeat the teacher's example by default because they were not afforded opportunities to practice thinking under conditions of cognitive autonomy support.

In contrast, consider Ms. Benjamin's classroom where autonomy support in the traditional sense was essentially nonexistent, yet the students showed tremendous proficiency in acquiring, applying, and sharing strategies for solving problems. They were responding to her support for being originators of ways to think about mathematical principles. She spurred on students to make decisions about how to think, to make connections, and to develop conceptual understanding of the mathematical ideas. Furthermore, she did not allow the students to leave without summarizing the different ideas that had been presented and articulating the elegance of those conceptualizations. Doing this may have helped students to formalize the mathematical thinking that had been occurring and allowed them to leave the classroom knowing more precisely what they had experienced and learned that day. When Ms. Benjamin asked for original ideas, there was never silence from these students. The difference between the students in the high organizational and procedural/low cognitive autonomy support and low organizational and procedural/high cognitive autonomy support classrooms might be in the amount and quality of opportunities to be independent thinkers they received. If students are allowed only to have choices surrounding procedural issues, then maybe it is not surprising that they have difficulty when asked to engage in complex, independent thinking. In addition to the number of opportunities to be independent thinkers, another difference might be in the amount of teacher modeling of the types of behaviors consistent with cognitive autonomy. In the high cognitive support classrooms, teacher modeling of such behaviors may have helped to move students along the continuum of externally regulated to self-determined behaviors (Deci & Ryan, 1985). The students in Ms. Benjamin's and

Ms. Adam's classrooms were able to practice being cognitively autonomous because their teachers provided them with models. Their teachers demonstrated how to think independently and in so doing supported students' attempts at independence. Becoming cognitively autonomous may need considerable support and practice.

This idea leads us to the fourth teacher in this series. Many researchers assert that motivational and cognitive growth greatly depends on how teachers and students negotiate control in instructional settings (e.g., Deci & Ryan, 1994; Vygotsky, 1978). Scaffolding plays an important role in supporting cognitive autonomy (Brown, Ash, Rutherford, Nakagawa, Gordon, & Campione, 1993; Turner & Meyer, 1999; Turner et al., 2002). By manipulating ideas, negotiating meaning, and sharing expertise, students discover how to extend their budding knowledge. Ms. Adam appeared to find the balance between student control and initiation and engaging in instructional conversations (Tharp & Gallimore, 1993) with her students. Rather than relying on a recitation format, Ms. Adam pressed students to become copartners in the learning process. For example, in the ice cream lesson, students provided elaborate explanations about how they navigated through the problem to get to their solutions. Because each group had a different explanation of the process, the conversations served as a catalyst for cognitive autonomy; students perceived themselves as experts in their own right. However, as involved in this process as these students were, it was not clear that they felt as confident of their mathematical understanding as those students in Ms. Benjamin's classroom, often indicating that the challenges in the classroom slightly exceeded their skills (Turner et al., 1998). One factor that may have helped to create this difference is the interaction of math ability level of the student and the sustained level of challenge provided to them by the teacher. Ms. Benjamin's students were considered to be high math achievers; whereas Ms. Adam's students were average math achievers. It could be that such a consistently high level of challenge may be exhausting to all but the very brightest of math students. A further distinction between the two teacher's approaches to supporting student independence that may have been instrumental in the observed difference can be found in the culminating moments of the lessons. Ms. Benjamin routinely ended her lessons by reviewing what the students had done, what they had heard other students suggest, and what they had learned. She underscored the important pieces of the day's work for these students. This may have provided them with a means of encoding their newly developed understanding such that they knew where they had been, how far they had come, and how far there might yet be to go. The students in Ms. Adam's class did not have the benefit of this summarizing effect. In fact, many lessons ended with a further request for student-generated understanding and justification. Without the benefit of the teacher's summarization and rewording of the mathematical ideas presented, these students may have been left feeling more uncertain about their newly developing understanding. In addition, Ms. Adam did not provide much feedback during lessons. She often asked for multiple student responses without commenting on whether students were on the right track. This lack of feedback during lessons may also have left the students less sure of their competence. These two classrooms provide exciting examples of the level of engagement that can be generated. However, it may be very important for the teacher to consider the balance between allowing student independence in thinking through complex conceptualizations and providing the framework into which students can place those self-generated ideas such that they know what they know and have learned.

The descriptions of the practices of these last two teachers share many of the qualities of teaching a press for understanding (Middleton & Midgley, 2002) and the ideas of Turner et al. (2002) on instructional support in terms of negotiation and scaffolding. However, we maintain that cognitive autonomy support is something different from either press for understanding or negotiation and scaffolding. *Press for understanding* broadly refers to a demand for cognitive engagement in classrooms and is variously measured in terms of teacher expectations for the students to engage in challenging tasks, in expectations of high effort, and in expectations and asking for explanations of why an answer is correct. Middleton and Midgley measured press for understanding through statements that asked students if their teacher asks them to explain their answers, gives them harder problems, asks them to do thoughtful work, and makes them think (p. 387). In a similar fashion, we are referring to teacher behaviors and statements. However, our reference is to the statements or implied teacher–classroom expectations that allow students to think in the first place, regardless of the correctness of their answer or their procedure. It might be that we are trying to identify the conditions under which teachers can press for understanding. What practices could they engage in that would create a climate where students will think on their own, rather than in a way consistent with the teacher's expectations or explanations? The emphasis here is not on the correct way, but on the student's way of thinking. Probably, the teacher from our observations who most exemplifies this is Ms. Benjamin, who often found students' strategies unexpected and requiring her own attention to the underlying logic. When she steps back and says "Look at this. Do you see what he did?," she brings the students in as contributors to their own learning. Similarly, although we acknowledge the importance of teacher scaffolding for student independence, we refer to the support of the teacher in helping students learn how to take other's perspectives—to see how their own ideas can be enriched and enhanced by the thoughts of others. In this respect, the teachers act as models for the students as they develop the skills of social constructors of understanding.

DIRECTIONS FOR FUTURE RESEARCH AND PRACTICE

The ideas presented here suggest that there are different features of autonomy support that can be identified and characterized. These ideas may have developmental and practical importance as well as theoretical significance. Table 2 represents instructional strategies and student responses that represent the different features of autonomy support. From this schematic, it can be seen that promoting only organizational or procedural autonomy in the classroom may generate some unintended consequences. For example, in attempts to implement current theory into practice, there may be a tendency to focus on the procedural and organizational aspects of the task. Blumenfeld, Soloway, Marx, Krajcik, Guzdial, and Palincsar (1991) suggested that instruction must revolve around the instructional intent of the task—a "driving question." Digressions from the driving question may distract students from the more cognitive requirements of the task. When this happens, the true benefits of allowing choice may be overridden by a focus on the procedural aspects of the task. Thus, a focus on the surface features of the task may actually prevent some students from engaging in the higher cognitive processes that many tasks are designed to tap. The observations from these classrooms suggest that supporting cognitive autonomy may be more effective for developing student engagement in these higher cognitive processes. Students in the classrooms characterized by higher levels of cognitive autonomy support actually offered their thoughts about academic issues, whereas those in high organizational or procedural/low cognitive autonomy support classrooms did so much less often.

An overemphasis on organizational or procedural autonomy may lead to cognitive overload for some students and actually result in less critical thinking. For example, Corno and Rohrkemper (1985) insisted that students must have necessary cognitive and self-regulatory skills to be able to cope with academic decision-making responsibilities. Such cognitive and regulatory strategies themselves have a developmental nature. Paris and Paris (2001) noted the importance of self-appraisal and self-management of thinking, effort, and affect in relation to the development of self-regulated learning. Also, Eccles, Buchanan, Flanagan, Midgely, and Yee (1991) spoke to issues surrounding decisions about the appropriate amounts of control and autonomy that should be exercised as a function of developmental level. Although the Eccles et al. study focused on early adolescence, the cautions are germane in considerations for any developmental group. Similarly, Ames (1992) suggested that, if students are unable or unwilling to regulate their own behavior in line with classroom opportunities for choice and control, then it is unlikely that these opportunities will have a positive influence on motivation. For younger students, allowing choice and decision making about too many issues may become intimidating or confusing, yielding counterproductive results (Ames, 1992; Corno & Rohrkemper, 1985).

Certainly the same cautions should be exercised regarding the drive for cognitive autonomy. Attempts at inducing this kind of student thinking in the classroom should not be equated with requiring complete independence for conceptual understanding from the students. Cognitive autonomy support centers on the idea that the student is sharing in the responsibility of the decision making in the classroom milieu, not that the student is the sole decision maker (see, also, Garcia & Pintrich, 1996). McCaslin and Good (1996) coined the term *coregulation* to express the interdependent relationship between the student and teacher in making decisions and

TABLE 2
Examples From Mathematics Instruction and Different Features of Autonomy Support

Low O and P/Low Cognitive	*High O and P/Low Cognitive*	*Low O and P/High Cognitive*	*High O and P/High Cognitive*
Instructional directive			
Follow along as I read	Look at my model	Think about what it means to switch back and forth between decimals and percents	You have lots of time to think about this and justify your thoughts
Write this on your study sheet	Predict percentages	If you understand that there are many approaches, you will always find a strategy that works	Compare and contrast your ideas
Remember this for the quiz	Calculate percentages	Think about this for a while	Choose the best idea that fits with the mathematical theory
All you have to do is move the decimal	Convert percentages to decimals and fractions		Explain how you were thinking to your peers
Memorize the pattern	Choose objects to create your own project		Give me a different way you would approach this problem
Potential student response			
Memorization	Copy the model	Offer many different approaches Share ideas with classmates	Each group has a different method Share mathematical expertise with classmates Use errors to learn

Note. O = organizational; P = procedural.

choices in the classroom context. Attention to the developmental aspects of metacognitive abilities may be important as students strive to become cognitively autonomous. The teacher's role may be to provide focused scaffolding for metacognitive skills to aide in the student's development of cognitive autonomy.

As instructional leaders, teachers must strike a balance between organizational and procedural autonomy support and responsibility. If there are limits to the amount of choice students can handle, it might be judicious to offer choices relevant to critical thinking rather than procedural embellishments. If a teacher offers students opportunity to exercise cognitive autonomy, that offer should be accompanied by appropriate feedback. Certainly it may even be wise to set limits on children's behaviors in an autonomy-supportive manner (Deci & Ryan, 1994; Eccles et al., 1991; Koestner, Ryan, Bernieri, & Holt, 1984). Indeed, perhaps paradoxically, it may be the structure and guidance that help to foster autonomy.

CONCLUSION

Organizational and procedural autonomy support alone may not facilitate truly adaptive learning and motivation. Rather, the characteristics of ownership and justification of ideas, the construction of meaning, and the intentional self-reliance used in critical thinking are at the heart of learning and motivation in the classroom. We suggest that, although choice and decision making are fundamental, more than simple choices about tasks or roles are necessary to influence students' decisions to become cognitively engaged in academic tasks. Activities that support organizational or procedural autonomy may be necessary but insufficient to promote student engagement and intrinsic motivation. Cognitive autonomy support may be the essential ingredient without which motivation and engagement may not be maximized.

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