PRESERVICE TEACHERS' REASONING ABOUT CASES WITH MOTIVATIONAL DILEMMAS

by

ASHLEY MARIE OWENS

(Under the Direction of Shawn M. Glynn)

ABSTRACT

The present study consisted of two experiments conducted with preservice teachers enrolled in introductory educational psychology classes. The findings provided evidence for the effectiveness of written cases in solving motivational dilemmas and shed light on the conditions that foster the transfer of knowledge from one written case to a related one. Consistent with a constructivist view of learning and transfer, the conditions included both characteristics of the preservice teachers themselves as well as characteristics of the cases. One finding was that preservice teachers who are highly motivated themselves, as indicated by the Motivated Strategies for Learning Questionnaire, tend to construct a greater number of valid solutions to motivational dilemmas, particularly intrinsic-motivation solutions. This is important because intrinsic motivation is considered to be particularly important by educators and because preservice teachers who are intrinsically motivated themselves may foster intrinsic motivation in their students. This finding implies that motivation to learn is an essential characteristic of those preservice teachers who become adept at encouraging others to learn. Another important finding was that studying analog "closed" cases helped preservice teachers construct a greater number of valid solutions to motivational dilemmas in "open-ended" target cases. This finding empirically

documents the effectiveness of using written cases in an instructional context where one week separated the cases and the preservice teachers were not informed that the cases were related. A majority of the preservice teachers reported in subsequent interviews that they connected the cases on their own and found the analog closed cases to be helpful. A third important finding was that when preservice teachers were provided with both intrinsic and extrinsic motivation examples, more intrinsic solutions were constructed than extrinsic ones, perhaps reflecting a preference for intrinsic solutions. From a theoretical perspective, the findings suggest that analog closed cases can provide instructional scaffolding for preservice teachers and provide rich, situated contexts for learning.

INDEX WORDS:Analogical thinking, Case-based instruction, Case-based learning, Case-
based reasoning, Case-based pedagogy, College students' motivation,
Constructivism, Motivation, Preservice teachers

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CHAPTER I

INTRODUCTION AND RATIONALE

Educators agree that students need more opportunities to connect the theoretical constructs that are taught in many teacher education programs with the practical applications of these constructs in classrooms and workplaces. As a result, the traditional, lecture-style approach to teaching that has been, and continues to be, used in teacher education is increasingly being overshadowed by more practical, situated approaches such as case-based instruction (Ertmer & Dillon, 1998; Diamantes & Ovington, 2003; Wright, 1996). Case-based instruction is a dynamic, evolving approach that provides opportunities to connect theoretical constructs with practical opportunities.

Case-based instruction has been used in various fields such as medicine, law, business, and education. In education, case-based instruction is intended to help teachers, particularly preservice teachers, solve instructional problems by learning the strategies used in exemplary solved ("closed") cases and transferring them to similar unsolved ("open-ended") cases. Typically, the cases present the preservice teachers with a dilemma that is intended to bring about deliberation, thought, and adoption of strategies (Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003). The rationale behind the use of cases is that they provide preservice students with examples and serve as models for situations they will face later in their professional practice (Reeves & Weisberg, 1994; Reisbeck & Schank, 1989). The inclusion of cases in textbooks for preservice teachers has increased sharply in recent years. A representative rationale for the inclusion of cases in educational psychology textbooks is presented by Slavin (2006):

To support the focus on intentionality and reflection, this edition introduces new

Teaching Dilemmas: Cases to Consider throughout the chapters. Each case offers a dialogue or vignette intended to evoke thoughtful discussion and debate on issues educators constantly face. (p. xix)

Although the use of written cases in educational psychology and educational methods textbooks has become very popular, and it is assumed that the inclusion of these help preservice teachers learn strategies and transfer them to open-ended cases, there is little empirical evidence that documents this, particularly of the kind based on comparisons of experimental and control groups. Accordingly, one purpose of the present study was to provide empirical evidence for the effectiveness of written cases in one of the most important areas of educational psychology, motivating students to learn. A second purpose was to shed light on the conditions that foster the transfer of knowledge from one written case to another. Consistent with a constructivist view of learning and transfer, the conditions that were examined included both characteristics of the preservice teachers themselves as well as characteristics of the cases.

CHAPTER II

REVIEW OF LITERATURE

Case-based instruction is an approach in which preservice teachers are actively engaged in thinking about predicaments that reflect the kind of experiences that are typically encountered in the teaching profession (Ertmer & Dillon, 1998). Case-based instruction is intended to help preservice teachers to think like practiced teachers. Case-based instruction is considered by many educators to be more demanding, engaging, and stimulating than traditional approaches to instruction.

Case-based instruction is consistent with a constructivist philosophy in which students construct their own understanding of the world by reflecting on their experiences and developing mental models that help make sense of the world around them (Koballa & Tippins, 2004; Peterson & Knapp, 1993). One of the basic constructivist principles is authenticity. Authenticity is the idea that students are engaged in activities that build connections between the academic setting and the real world (Koballa & Tippins, 2004).

Contemporary educators increasingly recommend case-based instruction because this method allows students to have an active part in constructing their own learning. Contemporary educators believe that learning should take place in a meaningful context. Case-based instruction is an experiential type of learning. Constructivists consider this advantageous for students because they believe that active, experiential learning is the most effective (Paris & Newman, 1990; Welty, 1989).

Case-based instruction contextualizes teaching by presenting situations involving teachers, classrooms, students, and problems that occur in education. Cases show evidence of theory in use. The case-based method of instruction stems from the business, law, and medical professions. Cases were a method of instruction in the law profession as far back as 1871, with the medical field following shortly thereafter.

There is a distinction between case studies and case-based instruction. Case studies are a form of qualitative research in which vast amounts of information are collected and then analyzed. Case studies are comprehensive, third person accounts about a particular person or situation (Shulman, 1992). Case-based instruction, on the other hand, refers to using a narrative as an instructional tool (Kowalski, 2001).

Nature of Case-based Instruction

Cased-based instruction is based on analyzing narrative cases. Cases can take the form of short stories. Narrative cases present the readers with particular situations that are purposely intended to bring about contemplation, deliberation, and thought (Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003). Narrative cases that are written by teachers depict something that actually happened in their classrooms or schools: "Stories are central to the lives of teachers; much of what teachers know and understand can be captured only in a storied form" (Koballa & Tippins, 2004, pp. 6-7). Often, cases contain the actual dialogue from the particular events, while keeping all names confidential. Autobiographical and biographical cases are considered helpful because they are genuine and inviting (Sheldon, 2004). Cases can involve other teachers, students, administrators, or parents.

Open-ended Cases and Closed Cases

Cases are designed as either open-ended cases or closed cases. An open-ended case is one in which the author does not provide a solution to the dilemma; it is left to the listeners or readers to formulate possible solutions and provide reasoning for those solutions. For example, an openended case may involve a teacher that suspects some students of cheating on the final exam. The case would end without divulging how the teacher decided to handle the problem. A closed case could include the same story, but go on to tell about how the teacher decided to confront the students and have them take an alternative test before assigning the final grades. In other words, a closed case discloses how the teacher chose to deal with the situation (Koballa & Tippins, 2004).

In one popular application of case-based instruction, an instructor presents cases to a group of preservice teachers and then opens the floor for discussion of the dilemmas presented in the cases. During the discussions that follow, the preservice teachers contemplate how the dilemmas should be solved and how decisions will affect the situations. The discussions following closed cases are chances for the preservice teachers to give their opinions, thoughts, and reactions to the solutions that were stated in the cases. Often times, cases are followed by questions that can be used to spark discussion among the group members.

Varieties of Case-based Instruction

Many varieties of case-based instruction exist. For example, it can be used by individual preservice teachers who are working on their own, it can be used in pairs, it can be used in small group settings with or without a group facilitator, and it can be used in whole-class discussions. The discussions are what lead students to distinguish the relevant information from the irrelevant information and to think about the factors that surround a dilemma and who and what plays into

that conflict. The cases' structure, substance, and discussions should all be connected and significant. To give unequal preference to one of these would be a methodological bias (Shulman, 1986).

The following categories, or forms, depict how cases are most often presented in education: (1) textbook cases, (2) casebooks, (3) conversations and videotapes, (4) subject-specific cases, and (5) context-specific cases (Diamantes & Ovington, 2003, p. 466). In these forms, there are various ways to implement case-based instruction. Three of the most common ways are: using cases to facilitate instruction, using cases to support critical reflection, and using cases as a tool for research (Koballa & Tippins, 2004).

Advantages of Case-based Instruction

Case-based instruction can facilitate learning by allowing preservice teachers an opportunity to see how theory transfers into practice (Wright, 1996). Preservice teachers use cases as practical examples that put into practice the theories they have learned in college classrooms (Olorunnisola, Ramasubramanian, Russill, & Dumas, 2004).

Case-based instruction supports critical reflection. Critical reflection is a process that enables preservice teachers to critically think about their beliefs and morals, their teaching practices, students' learning, and how other teachers interpret the events in the cases (Koballa & Tippins, 2004). Preservice teachers can use critical reflection as an opportunity to analyze the problems in the cases and decide what would be the most effective method of action. Critical reflection is needed in order for preservice teachers to respond to the cases that they read. Also, critical reflection is a process that is needed in order for educators to write cases for case-based instruction. Teachers and preservice teachers use critical reflection not only to solidify their own beliefs, but also as a way to question the evidence and challenge pre-existing beliefs (Burbules, 1993; Wright, 1996).

Case-based instruction provides a context for research. For preservice teachers, cases can be a form of *action* research. Preservice teachers can participate in writing their own cases about their own experiences. In addition, beyond looking at traditional, quantitative literature, the use of cases allows preservice teachers an actual glimpse into real classrooms. It allows preservice teachers to experience the actual dialogue that depicts experiences in real classrooms.

Cases tend to be very generalizable. They can be applied in virtually any subject and at any level (Wassermann, 1994). Also, cases can be applied in a variety of ways. Preservice teachers can use cases to gain a better understanding of the material in their textbooks. The cases provide contexts for the concepts discussed in class. Preservice teachers also can use cases as sources of insight to the types of problems that they may encounter in their own classrooms. The purpose of case-based instruction is not to simply give preservice teachers a catalogue of various instructional practices. Instead, case-based instruction represents how instructional practices affect students' thinking and all of the different interactions that take place in a learning setting (Loucks-Horsley et al., 2003). Diamantes and Ovington (2003, p. 466) compiled the following advantages of case-based instruction that continuously reappear in the educational literature: (1) it helps students develop skills of critical analysis and problem solving, (2) it encourages reflective practice and deliberate action, (3) it brings reality into the arena of theory, (4) it involves students in their own learning, and (5) it promotes the creation of a community of leaders.

Often in the case-based instruction literature, the point is made that case-based instruction is a process rather than a product (Ertmer & Dillon, 1998). By going through the process of

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figuring out the problems in cases and figuring out how to respond to those problems, preservice teachers learn how to respond to problems that may not be clear-cut. By using cases, preservice teachers can see that the dilemmas that occur in real life classrooms seldom occur in isolation and can have long-term ramifications (Wright, 1996).

Guidelines for Case-based Instruction in Teacher Education

Instructors use cases to examine preservice students' thinking within a context, to determine if the students have any misconceptions, and to analyze how students construct ideas (Diamantes & Ovington, 2003; Ertmer & Dillon, 1998; McDade, 1995; Shulman, 1992). Before implementing case-based instruction, however, instructors must consider their instructional goals (Leonard, Mitchell, Meyers, & Love, 2002). This consideration is important because case-based instruction is a method directed toward goals such as helping students develop hypotheses and ideas, increasing student engagement, and encouraging critical thinking. This is quite different from the focus of traditional lecture-driven instruction where the goal is transmitting factual knowledge (McKeachie, 1999).

Among the guidelines to consider when using case-based instruction with preservice teachers, the following are important in the implementation phase (Loucks-Horsley et al., 2003): (1) attitudes of participants and facilitators, (2) skills of facilitators, (3) time, and (4) access to quality cases. The use of case-based instruction is most beneficial when the preservice teachers and the facilitators are committed to improving their own teaching. Their attitude towards using non-traditional, practical examples will influence how successful this method is in preservice education.

It is important to note that case-based instruction need not include a discussion period or a facilitator. For example, a preservice teacher may read a case from a book. Since the preservice teacher is doing this on an individual basis, there may not be group discussions of the case, although this could certainly be helpful. Likewise, when using case-based instruction with a class of preservice teachers, an instructor may not necessarily assume the role of a facilitator, but this could also be helpful. Some instructors prefer to appoint a student to be the facilitator. The role of the facilitators is to lead the discussions and guide the rest of the group towards considering the central issues in the cases. Facilitators should have knowledge of how to lead a group and how to facilitate the discussion process.

Case-based instruction requires more time than traditional lecture-based instruction. Preservice teachers need adequate time to think through the cases and discuss them. The amount of time allotted to cases and the case discussions is dependent upon the instructor, students, topics, etc. This will vary from case to case and from class to class.

The quality of the cases that are used is a very important consideration. The cases should be clear and useful to preservice teachers. Using cases in which preservice teachers can identify some of their own teaching issues is motivational and allows them to draw upon their own experiences during the discussion: "It is critically important that when teaching through cases, individuals have extensive opportunities to consider how cases relate to their personal experiences and to how others make sense of the story" (Koballa & Tippins, 2004, p. 4). Once preservice teachers have a sense of connection, they have an easier time thinking critically about cases that present ideas that are dissimilar to their own. When preservice teachers encounter ideas dissimilar to their own, they may experience disequilibrium. This disequilibrium is what guides preservice teachers to evaluate and assess their own ideas. Disequilibrium is essential in changing beliefs and practices (Loucks-Horsley et al., 2003).

Implementing Case-based Instruction: An Example With a Class

This is an example of what case-based instruction could look like when implemented with a class of preservice teachers. As stated earlier, case-based instruction can be used in a variety of ways, so this is just one example of one way. First, an instructor could select a topic (e.g. effective teaching, classroom management, ethics, etc.). Next, the instructor could choose an appropriate case to facilitate the given topic. The instructor may opt to construct a case by writing it, or he or she may opt to pick a case that has already been written. The case should be well written and should evoke student questioning. It should not be so excessively complex that students become confused or are unsure of the dilemma in the case. If so desired, the instructor may add questions to guide discussions of the cases (Leonard et al., 2002; Loucks-Horsley et al., 2003).

The group of preservice teachers could then be given the case and asked to read it silently, and as they read, they should put themselves in the places of those people in the cases. The preservice teachers might write down their ideas as they read so that they can be discussed later. After reading the case, the preservice teachers could pair up to identify the dilemma and the salient issues from the case. The preservice teachers could then regroup as a whole class to begin a discussion. Some instructors might opt to have the students write the issues that they discussed in small groups on chart paper or a blackboard to focus the discussion (Leonard, et al., 2002).

The instructor, or the appointed facilitator, then begins the discussion of what the preservice teachers thought about the events in the case. The facilitator can use the preservice teachers' ideas, as well as the predetermined questions, to guide the discussion. The facilitator could also ask the preservice teachers to assess the effectiveness of the case.

Another option for using case-based instruction might be to have the preservice teachers read the cases individually and follow the guiding questions on their own. Further discussion might involve several small groups of preservice students in the class. Still another option might be to have the preservice teachers read aloud sections of the cases to one another. There are many possible options.

Using Discussions as Part of Case-based Instruction

One way of using cases is the analysis of a dilemma by means of discussions (Wright, 1996). Case discussions facilitate and enrich preservice teachers' beliefs and understanding about teaching, provide chances for preservice teachers to think critically about teaching, encourage preservice teachers to be problem solvers and to ask questions, and lead preservice teachers to research different perspectives (Loucks-Horsley, et al., 2003). Boehrer and Linsky (1990) explain that there are at least eight purposes for case discussions: (1) to foster critical thinking, (2) to encourage student responsibility for learning, (3) to transfer information, concepts, and techniques, (4) to develop command of a body of material, (5) to blend affective and cognitive learning, (6) to enliven the classroom dynamic, (7) to develop collaboration skills, and (8) to teach questioning and self-directed learning.

When discussing cases, it is important for the instructors and preservice teachers to decide on the central issues of the cases. One goal of using cases is to have students link what they have learned in class (e.g., management, planning, and effective teaching) with a real life scenario (Wright, 1996). Loucks-Horsley et al. (2003, p. 171) provide a framework for evaluating key elements in case discussions. These key elements are as follows: (1) case materials present a focused picture of a specific aspect of teaching or learning, (2) case materials illustrate theory in practice, (3) case materials provide images of reform-oriented teaching and

learning, (4) teachers interact and learn through discussions, (5) cases are facilitated by a knowledgeable and experienced facilitator who promotes reflection by case discussions, (6) case discussions necessarily involve effective group dynamics, and (7) cases are relevant and recognizable. These elements are discussed in the following sections.

Case materials present a focused picture of teaching or learning. Observing teachers in their classrooms provides preservice teachers with a great deal of insight into the processes of teaching and learning. Using cases in preservice education allows all of the students a chance to experience the same scenario and dilemma at the same time. This focuses what the students are thinking about. This is unlikely to happen when relying just on actual individual observations. Cases discussions allow the students an immediate opportunity to deliberate the dilemmas in the cases.

Case materials illustrate theory in practice. An important goal of teacher education is to help preservice teachers learn the developmentally appropriate practices and subject or grade level standards that are essential for success in education. Using cases allows students to connect what they have learned, in terms of research-based knowledge and child-development knowledge, with their own teaching philosophies. Using cases exposes preservice teachers to a variety of classroom experiences that help to ground the theoretical principles that they learn in teacher education programs.

Case materials provide images of reform-oriented teaching and learning. Standardsbased teaching has challenged the way some teachers view the process of learning and has encouraged some teachers to change their classroom practices. Teachers may find this transition and adaptation to be difficult, but using cases to guide them can ease the transition. Cases offer preservice teachers a look at how other teachers have handled this transition and how their instructional practices are aimed at reform. Using cases for reform allows teachers to identify with the struggles of the teachers in the cases. Also, preservice teachers become more motivated when they can identify with teachers that are similar to them.

Teachers interact and learn through discussions. Discussing cases allows preservice teachers to interact with others as they work to express their opinions about what is happening in the cases. This interaction and expression helps preservice teachers to think about theory, look at situations from other perspectives, think through alternative strategies, and solidify their own beliefs and moral principles: "A goal of case discussions focused on teacher action is to develop in teachers an attitude of inquiry toward and strategies for inquiring about classroom practice" (Loucks-Horsley et al., 2003, p. 172).

Cases are facilitated by a knowledgeable and experienced facilitator. Case facilitators help preservice teachers to understand the problems in the cases, to clear up any confusion that they may have, and to steer the discussion in the appropriate manner. The facilitator strives to build common understandings among the participants and place the case in a larger context, helping all to see the big picture.

Case discussions involve effective group dynamics. Case discussions allow preservice teachers to work as a whole group or in small groups. Most group activities allow preservice teachers to develop a dynamic in which interactions are supported and differing ideas are valued. Preservice teachers work to establish teaching practices and case discussions allow them to explore additional or alternative practices.

Cases are relevant and recognizable. Preservice teachers should be able to identify aspects of their own teaching in cases: "In the teacher education literature, we often read arguments for case methods predicated on the goal of teaching teachers to be more

reflective...because of their complexity and multiple layers, cases lend themselves to programs that value such a view of the purposes of teacher education" (Shulman, 1992, p. 8). Some of the cases that preservice teachers work with are similar to their own personal experiences. This is beneficial because it allows preservice teachers to evaluate the decisions that were made and the consequences that followed. Some of the cases that preservice teachers work with are not similar to their own personal experiences. These cases are also beneficial because they allow preservice teachers opportunities to critically analyze and reflect on situations that they may face later. *Preservice Teachers and Case-based Instruction*

In order to prepare preservice teachers to effectively use cases in their own teaching, preservice teachers should practice writing cases. Writing cases is a valuable learning task for preservice teachers because the process of writing out the events and the dilemmas of their own classes is a type of reflective practice. This reflective practice is what is so highly valued in casebased reasoning, as well as constructivism in general.

Preservice teachers should spend time observing others who are experienced in using case-based instruction. Observing the various ways that other people use this teaching method will provide preservice teachers with inspiration and insight for their own use of cases. Preservice teachers may also want to practice using case-based instruction with a group of students and have a colleague observe in order to provide constructive feedback. Preservice teachers may also benefit from simply talking about case-based instruction with each other, as a way to explore different ideas (Diamantes & Ovington, 2003).

When using case-based instruction in practicum settings, preservice teachers should be aware of how their students perceive the value of the tasks they perform. The students' learning goals and their monitoring strategies will impact and shape their activities. Preservice teachers

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should consider ways to help students persist with activities even if they find them difficult (Ertmer & Dillon, 1998). Preservice teachers should take notice of how different students perceive similar classroom experiences (Ames, 1992). Students may not automatically perceive an assignment or activity as being valuable. Attending to how students perceive their work and what frustrates them provides insight to teachers as to how to support and motivate students. If students do not value a task, then their motivation to work on the task will be low. Preservice teachers should strive to identify factors that will increase students' task value for case-based instruction.

Preservice teachers should work towards communicating strategies that are needed to be successful, such as risk-taking and critical thinking. It is these strategies that help to improve the process. Also, preservice teachers should be thinking about good models, practice, and feedback when using case-based interaction (Ertmer & Dillon, 1998).

The use of cases motivates preservice teachers' learning and promotes transfer of knowledge from one situation to another situation. The ability to transfer knowledge creates more effective problem solvers and critical thinkers (Koballa & Tippins, 2004). Case-based instruction aids in developing skills such as critical thinking, decision-making, and problem solving. Cases are useful in helping preservice teachers perceive reality. Cases give preservice teachers a bridge to the real world (Cabe, Walker, & Williams, 1999).

Case-based Reasoning and Cognitive Processes

Case-based reasoning has been used in various fields such as medicine, law, business, and education. Case-based reasoning, broadly defined, is the process of solving new problems using the solutions of similar past problems. Case-based reasoning can aid problem solving through discussions and applications of strategies. Cases present novices with a dilemma that is purposely intended to bring about deliberation and thought (Loucks-Horsley et al., 2003). The rationale behind the use of cases is that they provide novices with examples and serve as models for situations that they may face later (Reeves & Weisberg, 1994; Reisbeck & Schank, 1989). Cognitive science research shows that knowledge gained through activities is more usable than the knowledge gained by simply memorizing facts (Brown, 1988). Case-based reasoning allows novices to participate in problem-solving activities and build a repertoire of different solutions and strategies that can be applied to solve similar problems.

Case-based Reasoning and Analogical Thinking

Case-based reasoning involves making analogical inferences. Cases are useful because novices tend to rely on their personal experiences to solve problems; however, some novices do not have the previous experience necessary to work through the dilemmas in the cases. Therefore, the more experience novices have using cases, the better equipped they are at applying problem-solving and decision-making skills to later cases, as well as real-life experiences (Kolodner, 1997). Case-based reasoning allows novices to reflect on what they have learned and how this could be helpful in the future. This reflection period encourages analysis and encoding, which makes the experience and what was learned helpful and accessible in the future. Using case-based reasoning allows novices to experience interacting with ill-defined problems. Analogical reasoning in the context of real-world problems is the driving force behind case-based reasoning (Kolodner, 1997).

Educators often use analogies to explain fundamentally important concepts (Bulgren, Deshler, Schumaker, & Lenz, 2000; Paris, 1999; Venville & Treagust, 1997). It is not surprising, therefore, that textbook explanations frequently make use of analogies (Iding, 1997). Authors frequently preface their explanations with expressions such as "similarly," "likewise," "just as," and "that is comparable to." These expressions are all ways of saying, "Let me give you an analogy." Analogies in science text are designed to promote *elaboration*, the cognitive process of constructing relations between what is already known and what is new. The construction of relations supports comprehension and can be intrinsically motivating when what is new is perceived as personally relevant (Wolters, 1998).

Elaboration can be defined more precisely as "any enhancement of information which clarifies or specifies the relationship between information to-be-learned and related information, i.e., a learner's prior knowledge and experience or contiguously presented information" (Hamilton, 1997, p. 299). Elaboration can be activated by questions, objectives, personal examples, and other strategies (e.g., Martin & Pressley, 1991; Seifert, 1993; Willoughby, Wood, & Khan, 1994), but analogies seem to be particularly appropriate because they can provide the rich, redundant contexts that successful elaboration requires:

Most explanations for the effects of elaboration center on the notion that elaboration increases the richness and redundancy with which we encode the set [of] propositions related to a specific memory episode....At the time of recall, we will activate only a small subset of the original propositions and attempt to reconstruct these propositions. The richer and more redundant the activated subset of propositions, the more likely the reconstruction of the original set of propositions....Richer within this context is operationalized as increasing the number of interconnections between the target propositions and prior or related learner propositions. (Hamilton, 1997, p. 300).

Elaboration plays a critical role in a constructivist framework for learning (e.g., Chan & Sachs, 2001; Dole & Sinatra, 1998; Glynn & Duit, 1995; Hogan & Maglienti, 2001). In this theoretical framework, students develop by learning progressively more sophisticated mental

models of fundamentally important concepts. Typically, these concepts represent complex systems with interacting components. For example, in the area of science, familiar analogs (e.g., water) often serve as early mental models that students use to form limited but meaningful understandings of more complex concepts (e.g., electricity). As the students develop cognitively and learn more in the content area, they adopt more sophisticated and powerful models.

Psychologists have studied analogical reasoning in at least three ways. One way is when students use already worked-out problems to serve as examples, or guides, to help solve new problems. A second way is the "classical analogy" of the form A: B:: C:? (Sternberg, 1977). A third way is case-based reasoning (Gick & Holyoak, 1980, 1983). In describing case-based reasoning, Gentner, Loewenstein, and Thompson (2003, p. 393) explain: "The idea is that people can readily learn specific examples, which then can serve as models or analogies for future situations."

Novices tend to use a type of analogical reasoning in which knowledge is transferred from within a domain. On the other hand, experts tend to use a style of analogical reasoning in which knowledge is transferred across domains (Reimann & Schult, 1996). For example, within the domain is illustrated by novices using previous knowledge about calculus to solve calculus problems. This does not require that the novices seek out information from another domain because the knowledge needed to solve a calculus problem is stored in one domain (Robins, 1996). On the other hand, some problems require that novices transfer information from one domain to another in order to understand a task or problem. Dunckner's (1945) classic *tumor* problem is an example of this: A patient has a tumor in his stomach. The tumor must be operated on or the patient will die. However, the ray that is used to destroy such tumors is very intense and will destroy the tumor, but not without damaging a large amount of healthy tissues. If the doctor uses the ray at a low intensity then the healthy tissues will not be damaged, but the low intensity is not strong enough to destroy the tumor (Holyoak, 1984, p. 205).

This is a difficult problem for novices to solve; however, it may be made easier to solve if the novices have previously been exposed to similar problems, such as the *General* problem:

A general wants to capture a fortress but cannot send his army down just one road because of the land mines. Instead, he must divide his army into groups and have them take different roads until they meet at the fortress simultaneously (Anderson, 1995, p. 246).

Using the *General* problem as an analogy, novices usually can solve the tumor problem by transferring information from one domain to another. Novices could suggest that based on how the general solved his problem, the doctor could use the same strategy. The doctor could target the rays towards the tumor in several directions in a way that the healthy tissue is not damaged, yet the tumor still receives rays that are strong enough to destroy it. Solving problems in this way is a sign of genuine expertise: "A characteristic of expertise may be the ability to transfer concepts learned in one domain to solve problems in a different context" (Gentner, Loewenstein, & Thompson, 2003, p. 394). It takes knowledge of many analogical concepts to become an expert (Chase & Simon, 1973).

Using Examples as Analogies

Using examples helps novices to interpret the problem at hand (Reimann & Schult, 1996). The task of interpretation requires common sense, as well as subject-matter knowledge

(Reif, 1987). Examples provide a blueprint or a plan for the steps to solving a problem. If novices do not have examples to follow, they may encounter a variety of solutions that may seem to apply, but in reality do not. If the correct solution is not used, then the novice must backtrack, which is counterproductive.

Novices also use examples because they help to determine what contextual features of the problems are structural and what features are superficial. Structural features can affect the problems' solution. If a structural feature in the example is different from a structural feature in the problem at hand, then the solution may be different. However, if a superficial feature in the example is different from a superficial feature in the problem at hand, then it is unlikely that the solution to the problems will differ (Reimann & Schult, 1996). Superficial features are the elements of arbitrary information in the cases (Yanowitz, 2001). For instance, the following two stories (Yanowitz, 2001, p. 379) provide both structural information and superficial information to the readers.

Story of Signe Snakes

Signe snakes use camouflage to defend themselves against enemies. Signe snakes are typically green. When the snake senses that an enemy is coming near, it discharges a hormone that changes its skin to a reddish brown color, the same color as the dirt. The snake practically disappears against the dirt when it is this color. As a result of the energy needed to make the hormone, the Signe snake consumes a great deal of food relative to its size. The Signe snake likes to live in warm climates.

Story of Beazons

Scientists have discovered a creature called Beazon on another planet. Beazons protect themselves against predators. Beazons are normally blue. Beazons live in lakes that have many underwater coral reefs. When a Beazon sees a predator approaching, it releases a chemical that will turn it a whitish gray that is identical to the coral and the Beazon blends right in.

The structural information in the two stories includes the statements having to do with the Signe snake and Beazons protecting themselves by camouflaging with their surroundings. The superficial information includes the statements that the Signe snake consumes a large amount of food and that the Signe snake lives in warm climates. These statements are irrelevant to the main idea of the stories, which is how animals use camouflage for protection.

Source Cases and Target Cases

Formulating and applying analogies from previous cases is helpful in understanding new cases (Gentner & Markman, 1997). Source (or analog) cases are cases that novices have already been exposed to. These are used to make inferences about target cases, cases that novices may be working on at the present time (Halpern, Hansen, & Reifer, 1990; Markman, 1997). The following is a 3-step description by Kolodner (1997) of how novices use source cases to help understand target cases:

1. Encoding. Novices interpret source cases and encode them into long-term memory using assimilation or accommodation. It is important to remember that with some students, this encoding may be based on superficial features.

2. *Retrieval*. Novices' memory is probed by a target case. The quality of the probe into memory is dependent upon how well novices interpreted both the source and target cases. Cases that have been fully interpreted tend to yield better access in memory than cases that have not. Yield means the more likely the novices are to find a case in memory that is relevant to the target case.

3. Evaluation. Novices evaluate how source cases match up with the target cases. If information is altered (i.e. a strategy from a source case is altered to fit a target case), then novices encode and store the newly constructed information in memory.

According to Kolodner (1997), failure plays an important role in case-based reasoning. When reasoners' expectations fail, they discover that they need to learn something new. Failure also lets novices reinterpret cases and reorganize how cases are indexed in their memory. Transfer occurs when novices are able to apply what they have learned to a new situation. Teachers can aid transfer by having novices explain what they have learned. Explanation leads to a clearer understanding of the cases. A clearer understanding leads to better encoding; however, not all aspects of the source cases may apply to the target cases. Novices may overextend analogies (Paris & Glynn, 2004; Spiro, Feltovich, Coulson, & Anderson, 1989). Novices tend to "use examples in a suboptimal fashion, leading to transfer problems" (Reimann & Schult, 1996, p. 123).

Why is it that novices fail to apply previously learned cases to the case at hand? One reason is that novices tend to rely more on the superficial features of cases (Gentner, 1989). If these features do not match, then novices assume that the cases are unrelated. Novices tend to encode cases depending on their superficial features (Gentner et al., 2003). If a source case and a target case have different details, then it is less likely that analogical transfer will take place because the novices are not supplied with the necessary features for transfer to take place, which are structural features (Reimann & Schult, 1996).

In a classic study by Ross (1984), novices were asked to study mathematical problems that were fully explained. Later, when asked to solve other math problems and to explain any of the problems they were reminded of as they worked, around 80% described similar problems to

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those that contained superficial features. Superficial similarities tend to be noticed more than structural similarities by novices, but this is not true of experts (Gentner et al., 2003).

Focusing on superficial features may result in nontransfer of knowledge because novices often limit themselves to just the cases that they know, those cases that are in their memory. Novices focus on cases that seem identical and usually ignore the cases that may not be identical, but are relevant (Reimann & Schult, 1996). Relying only on cases that are superficially identical to the target case can often lead to poorer problem-solving because the cases may have some features in common, but this does not mean that the solutions will be the same.

In order to use analogical reasoning to solve problems, several things must be taken into account (Carbonell, 1986; Reimann & Schult, 1996). First, it is important to know what it is about the example or the source case that stays with the novice. What features are most salient? Second, teachers should examine novices' retrieval. Why is it that cases are chosen from all the problem-solving methods that are stored in novices' long-term memory? Third, teachers should help their novices use accommodation or assimilation. How can novices best apply what was learned from the first problem to the problem at hand?

Transfer

According to Woolfolk (2001) transfer is "The influence of previously learned material on new material" (p. 601). Transfer is often distinguished as near-transfer or distant-transfer (Salomon & Perkins, 1989). Near-transfer is used to describe situations in which the knowledge previously learned is transferred to a new situation in which the same knowledge is required. On the other hand, distant-transfer is used to describe knowledge previously learned that may differ in relation to the new situation or task. For example, novices may be taught how to solve multicolumn addition problems. When novices encounter the same type of problems later on, they will know to use the skills previously learned. This is referred to as near-transfer of the skills. Conversely, novices will encounter problems that are similar to these in that they are multicolumn, but the new problems may be subtraction problems. These subtraction problems require new skills such as borrowing. This is an example of distant-transfer (Woltz, Gardner, & Gyll, 2000).

Thorndike's theory of identical elements states that learned knowledge is more likely to transfer to new situations when there is considerable overlap between the two situations. This same idea can be applied to case-based reasoning. The more overlap between a source case and a target case, the better the transfer. When components of a source case overlap considerably with a target case (near-transfer), and students successfully use this information, then positive transfer is said to have taken place. Positive transfer is found primarily under near-transfer conditions (Woltz et al., 2000).

Negative transfer can also be found under near-transfer conditions. Negative transfer is when previous learned knowledge impedes another situation. For example, learning how to play racquetball may be difficult for some people because their previous knowledge of tennis impedes some of the knowledge required to play racquetball. When using case-based reasoning, novices may incorrectly apply information from their long-term memory and from previous cases to target cases, resulting in negative transfer. Negative transfer is sometimes referred to as interference.

Cognitive-transfer tasks typically require the application of previous knowledge to a different problem that may be in the same context or in a different context (Phye, 1990). Transfer can be measured by having students complete a transfer task. For example, a teacher could evaluate how the students respond to a target case either directly after working with a source

case, or by having the students respond to the target case days or weeks later (Phye, 1989). According to Sternberg and Frensch (1993), transfer depends on four mechanisms: (1) Encoding specificity: how information is encoded into memory, (2) Organization: the way in which information is incorporated into already existing information structures, (3) Discrimination: how well one is able to discriminate related information from non-related information, and (4) Set: the way in which one views a situation, dispositions to certain routines or procedures when solving problems.

Conclusion

Transfer is central to case-based reasoning. Novices solve problems better if they have had previous experience in solving similar problems (Novick, 1988). Cases that are similar to cases used previously will promote transfer. For example, when novices are provided problems with gaps of missing information, novices who close the gap by following the reasoning behind the problem learn to transfer better than novices that read problems without any gaps (Merrienboer & Croock, 1992). In other words, the process of reasoning leads to a better understanding. Case-based reasoning, in particular, is beneficial because it promotes meaningful understanding.

One way to help novices analyze cases is to provide strategy training. Novices should be taught strategies to help them transfer. Some strategies could help them generalize, while others could help them discriminate and distinguish superficial features from structural features.

Technology can help novices analyze cases too. For example, a computer-based memory assistant can be used to support working memory limitations and indexing problem-solving cases to be used later (Reimann & Schult, 1996). The program's job would be to remind the novices of other cases that may have something in common with the case at hand. Novices would have access to a case library that indexes other cases. Novices would enter new case information, making modifications where necessary and the cases that contain solutions or examples similar to the target case would be retrieved.

Goal Orientation of Preservice Teachers

While there are many characteristics of preservice teachers that can influence their casebased reasoning, one that is potentially very significant when the cases involve motivational issues is the teachers' *goal orientation*. This characteristic, which is an important construct in *goal setting theory* (Schunk, 2004), can influence the decisions that preservice teachers make about how they motivate their learners. Goal setting theory plays in educational psychologists' understanding of motivation, and the implications for the instruction of preservice teachers. According to Schunk (2004):

Goal setting theory represents a relatively new conception of human motivation, although it incorporates many variables hypothesized to be important by other theories. Goal setting theory postulates that important relations exist among goals, expectations, attributions, conceptions of ability, motivational orientations, social and self comparisons, and achievement behaviors. (p. 363)

Goal Setting Theory

Psychologists and educators continuously strive to understand what motivates students and how goals impact their motivation. In the late 1960's, prior to goal theory, the three main theories for studying human motivation were drive theory, reinforcement theory, and subconscious theory (Locke & Latham, 1994). Drive theory was based on the premise that humans engaged in hit-and-miss activity until a physiological need was inadvertently met. Once the need had been met, the drive to continue to engage in random activity was decreased. Reinforcement theory was a behaviorist approach based on Skinner's idea that human behavior was controlled by reinforcers and punishers. Subconscious theory was based on McClelland's (1961) idea that human behavior was guided by the subconscious and, therefore, humans participated in activities that reflected the ideas, beliefs, and values that were not in conscious awareness.

An alternative to these three motivational theories was achievement motivation theory. Some of the most prominent conceptualizations of achievement motivation have been the test anxiety approach, the self-worth approach, the achievement-motive approach, and the achievement goal-setting approach (Elliot, 1999). The achievement goal-setting approach, or goal-setting theory, serves as the groundwork for a considerable amount of applied work in settings such as schools, work places, and sports (Elliot, 1999). Goal setting theory is used to understand achievement motivation in these settings (Weiner, 1990).

A basic premise of goal-setting theory is that human behavior is determined by conscious goals: "Goal setting theory, as we have developed it within the realm of work, lies within the domain of purposefully directed action" (Locke & Latham, 1994, p.15). When applied to academic settings, goal setting theory examines the motives and rationales that students take on when engaged in learning (Ames, 1992; Dweck & Legget, 1988).

Goals are the reasons for task engagement (Maehr, 1989). Many motivation theorists often reduce goals to two goal types. Dweck (1986) refers to the two goal types as *performance* goals and *learning* goals, whereas Nicholls (1984) refers to the two goal types as *ego involvement* and *task involvement*. Since the two goal types are viewed as being similar conceptually, the goal types are typically referred to as *mastery* goals and *performance* goals (Ames & Archer, 1987; Elliot, 1999).
Mastery Goals and Performance Goals

Students adopt mastery goals when they are intrinsically motivated and their intent is to learn and gain capabilities despite the fact that their performance may suffer. Students with mastery goals aim towards gaining as much knowledge as possible for the sake of selfimprovement (Ames & Archer, 1988). Mastery goals are associated with higher self-efficacy and more ambitious personal goals (Phillips & Gully, 1997). Students with mastery goals set higher are willing to put forth more effort. When faced with negative feedback, students with mastery goals tend to respond by adapting their persistence, effort, and strategies (Elliot & Dweck, 1988).

Students adopt performance goals when they are extrinsically motivated and their intent is to look competent in the eyes of other people (Woolfolk, 2004). Students with performance goals are more focused on competing with other students and comparing their performance to others. When faced with negative feedback, students with performance goals tend to adapt by revising their goals downward in order to exert as little effort as necessary, or may even withdraw from the task. Performance goals are based on normative comparisons. These students try to avoid potential failure, which leads them to select less difficult tasks. If failure does occur, these students are likely to attribute their failure to lack of ability (Dweck & Leggett, 1988).

In addition to mastery versus performance goals, one of the major distinctions in goal setting theory is referred to as *approach* and *avoidance* motivation. Approach motivation refers to behaviors and actions that are initiated by a desirable event. Avoidance motivation refers to behaviors and actions that are initiated by an undesirable event (Elliot, 1999). Both Dweck and Nicholls describe people with high competence perceptions and a performance goal, as seeking to gain attention by demonstrating their capabilities to others. People with low competence perceptions and performance goals seek to avoid having to demonstrate their capabilities to

others. This approach and avoidance form of motivation was incorporated into Lewin's (1944) resultant theory. This theory was the first formal model of achievement motivation.

Since psychology became a discipline, most major motivation theorists have incorporated the approach-avoidance concept into their research (Elliot, 1999). For example, Freud, who represents the psychodynamic theory, viewed striving for pleasure and avoiding pain as the keys to all psychological behavior. Thorndike, who is representative of the behavioral learning theory, described behaviors that are followed by something pleasurable as being more likely to occur again, whereas those behaviors followed by something unpleasurable are less likely to occur. Similarly, Skinner, who is also representative of the behavioral learning theory, is known for his ideas about reinforcement and punishment. Maslow, who is representative of the humanistic theory, used the approach-avoidance distinction in his theory stating that humans strive to abolish negative aspects of life and strive for more positive situations.

Elliot and Harackiewicz (1996) proposed a version of goal theory called the trichotomous achievement goal framework. This trichotomous framework is predominant in most school settings. This framework takes into account both the mastery-performance goal distinction and the approach-avoidance distinction. The three derived achievement goals are the mastery goal, the performance-approach goal, and the performance-avoidance goal. The mastery goal is focused on successfully learning something or successfully completing a task because of intrinsic motivation. An example of a mastery goal is "I want to learn and understand the concepts in this math course because they are very interesting." The performance-approach goal is focused on engaging in tasks to show competency compared to other people. An example of a performance-approach goal is "I want to get better grades than they do." The performance-avoidance goal is focused on avoiding being seen as incompetent by

others. An example of the performance-avoidance goal is "I do not want to do the math homework because I might get a bad grade." Thus, mastery goals and performance-approach goals are viewed as approach concepts because they both involve students striving for positive outcomes. The performance-avoidance goals are seen as avoiding negative outcomes.

A classic study found that both aspects of performance goals, performance-approach and performance-avoidance, could be manipulated by having the students focus on the possibility of a positive outcome or a negative outcome (Elliot & Harackiewicz, 1996). Each group of students was given instructions to solve a difficult hidden figure puzzle. The students in the performance-approach group received instructions that mentioned the possibility of success, while the performance-avoidance group received instructions that mentioned the possibility of failure. The findings supported the notion that the students adopt different goal orientations based on the mentioning of possible success or failure.

Mastery goals are associated with intrinsic motivation and positive outcomes. Mastery goals have been linked to self-engagement with the subject material, making the effort to study the material, persistence and self-determination, all of which are viewed as being positive processes. However, it is less certain that performance goals are associated with negative outcomes (Harackiewicz, Barron, & Elliot, 1998; Wolter, Yu, & Pintrich, 1996).

Although performance goals are associated with extrinsic motivation, many studies show that performance goals can promote adaptive achievement behavior (Elliot, 1999). Performanceapproach has been linked to both positive and negative processes, with the positive outweighing the negative. Some of the positive processes are the learning of material and high performance outcomes. The negative processes include test anxiety, low processing of information, and low likelihood of seeking help. Performance-avoidance goals have been linked to low selfdetermination, low absorption of material, and low self-regulation, which are viewed as being negative processes.

Expanding Views of Goal Orientations

It has been argued that four goal orientations are a better conceptualization than two (Elliot & McGregor, 2001; Pintrich, 1999). The first orientation of the four is mastery-approach. Students with this orientation are intrinsically motivated and interested in working on a task for the sake of the task, the knowledge gained, and increasing their ability. Mastery-avoidance, the second orientation, describes students who avoid mastery learning and who do not succeed at learning as much as possible. The third orientation, performance-approach, is the orientation that describes students that want to prove their ability to others. Finally, the fourth orientation is the performance-avoidance and it describes students who want to avoid appearing incompetent to others.

It has been suggested that other types of goals should be incorporated into the achievement goal framework. The goals receiving the most recent attention by researchers are work avoidance goals and extrinsic motivation goals. Work avoidance goals refer to behaviors such as doing whatever it takes to get through a class or an assignment (Meece, Blumenfeld, & Hoyle, 1988; Nolen, 1988). Instead of defining a certain type of achievement, the work avoidance goals actually represent the absence of achievement goal. Extrinsic motivation goals are goals in which students aim for an award.

Students set goals and then evaluate their performance in comparison to how close it comes to reaching the goal (Radosevich, Vaidyanathan, Yeo, & Radosevich, 2004). Control theory and other social cognitive theories attempt to explain discrepancies between students' performance and the goal. If students feel there is a discrepancy between their performance and

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the goal, they will use self-regulation in order to close the gap. By means of this regulation process, students decide to step up their performance, reevaluate their goal, or give up on the goal all together (Austin & Vancouver, 1996).

Goals Orientation and Affect

More is known about how students' goal orientation influences their cognition than their affect (Duda & Nicholls, 1992; Dweck & Leggett, 1988). Goal orientation is best understood when affective processes are taken into account. Cognition and emotion interactively affect motivation, particularly in academic settings (Turner, Husman, & Schallert, 2002).

An example of how goal orientation influences students' emotions is the emotion of shame. Shame is an emotion that is felt by students if they fail at an academic task. This is an example of how goals and emotions can be related. Shame can be harmful to student's goal-striving behavior because it is seen as the most unpleasant emotion and viewed as having the worst impact on motivation (Weiner, 1985).

If students experience shame as a result of failing to meet an academic goal, they may lower their pursuit to reach that goal again or tasks similar to it. On the other hand, in response to shame, some students may become more persistent in striving for the goal. The difference between these two groups of students has to do with how important the goals are to them. The emotion of shame is very disruptive to students' motivation. Shame is seen as being extremely negative because it represents failure relative to personal standards and ideals.

Students who put forth a high level of effort, and who nevertheless experience failure, view this as a lack of ability which can lead to feelings of shame. This is particularly harmful to students who possess low self-efficacy (Turner et al., 2002). Along with low self-efficacy, test

anxiety is a predictor of shame. Thus, shame can come from low self-efficacy, high test anxiety, and low self-esteem.

In conclusion, shame is an emotional reaction that may be a result of the goal-related process. Students can recover from the shame reaction if they have clear and important future goals. In addition to the intrinsic motivation to engage in academic goals, students should develop self-regulation strategies, metacognitive strategies, study strategies, and self-monitoring strategies.

Classroom Applications

Students' learning strategies and the learning tasks they decide to engage in will depend on whether they have adopted mastery or performance goals. It is possible, however, in school settings, for students to adopt both mastery and performance goals, depending on the class, subject, teacher, and peers.

Ideally, when students have both mastery and performance orientations they are both intrinsically and extrinsically motivated. They want to learn a great deal from a course, but also want to get the highest grade when compared to other students, this maintains their interest in course content and simultaneously supports their high academic achievement (Turner et al. 2002). Highly successful college students are those who master content that is intrinsically interesting and strive towards performance goals such as making high grades (Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000).

Often, students with mastery goals generally have intrinsic motivation, a positive attitude towards learning, can monitor their learning, and will use higher order learning strategies like organization and elaboration. Students with performance goals generally have extrinsic motivation and may use lower order cognitive skills such as memorization and maintenance

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rehearsal, look for short cuts, and tend to stay away from critical thinking and analytical problem solving (Rueda & Dembo, 1995).

From the cognitive perspective, researchers want to understand why students chose to engage in particular tasks over others. In order to understand this, researchers must take into account how students think about their goals, values, the task itself, their competence, and explanations for their success and failures. It must also be understood that these things are influenced by the goal orientations and motivations of the students' teachers.

Embedded in goal theory is the idea that the environment's goal structure may impact students' goal orientation inside that setting (Ames & Archer, 1988). As explained by Wolters (2004): "Goal structure describes the type of achievement goal emphasized by the prevailing instructional practices and policies within a classroom, school, or other learning environment" (p. 236). The mastery goal structure occurs when teachers communicate to students that learning for the sake of learning is valued. Also, teachers communicate that they strive to foster the students' genuine interests. The performance goal structure occurs when teachers give students rewards based on being successful and when competition is fostered.

In an academic setting, students are capable of taking on many goals. (Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002). Different classroom factors may impact students' goal orientation (Ames, 1992). For example, how the teacher grades the students, how students are compared to one another, and the type of assignments the students are asked to complete can determine how students motivate themselves (Wolters, 2004). There is a relationship between students' personal goal orientations and the classroom goal orientation. It has been found that the goal structure of the classroom influences what goal orientation students adopt (Wolters, 2004). For example, adolescent students have been found to have a stronger mastery goal orientation when they view their environment as mastery structured (Kaplan & Maehr, 1999). However, other researchers have reported shortcomings in these studies and are unclear if this same idea applies to the performance-avoidance goal orientation.

Important aspects of goal theory are the interconnections among goal orientation motivation, and learning strategies. Students with mastery learning goals tend to be intrinsically motivated and use more adaptive learning strategies (Pintrich & DeGroot, 1990). Undergraduate students with mastery learning orientations tend to make use of metacognitive strategies and selfregulation strategies (Archer, 1994). As for students with performance goals, the results are uncertain. Some studies have shown that these students tend to be extrinsically motivated and may adopt such learning strategies, but not as well as students with mastery goals; however, other studies also have shown that students with performance goals do not adapt or take on new learning strategies (Nolan, 1988). Teachers communicate classroom and curriculum goals to the students. These goals influence students' goal orientations. Rueda and Dembo (1995) provide an example that shows how teachers' actions can influence the actions and goals that students may adopt:

The first teacher simply tells students to write a term paper and hand it in on a certain date. The second teacher breaks the assignment down into different phases--prewriting (e.g., choose a topic, find, read and take notes on three sources, use correct bibliographic notation), drafting (e.g., develop thesis statement, identify subtopics, draft subtopics), revising, editing, and submission (e.g., review and revise full document, prepare bibliography and table of contents). He provides his students with a checklist of all the activities under each phase identifying the date each activity is due. He explains the criteria for each activity and provides feedback when it is handed in. As students

experience success at each phase, they are more likely to enhance their perceptions of competence. (p. 260)

Locke and Latham (1994, p. 22) suggest the following strategies be used when goal setting. These four strategies are aimed at keeping goals at a moderate, attainable level: (1) Set moderate goals so that the net total of satisfaction and productivity is maximized, (2) Give credit for partial goal attainment, rather than only for goal success, (3) Make goals moderately difficult at any given time, but insist on constantly raising the goals by smaller amounts, and (4) Use multi-level goal and reward structures, so that increasingly greater rewards are given for attaining increasingly higher goal levels. As yet there has been no research comparing the effectiveness of these four procedures.

Specificity of Goals

Goals that are specific tend to be more motivating than general goals. Specific and somewhat difficult goals lead to higher performance. General goals, particularly those that are unclear and unchallenging, do not elicit high performance. Goals such as, "Work as hard as you can," are less motivating because they are too vague. Specific goals warn students as to how much effort is expected; therefore, once the goal has been mastered, the students feel a sense of accomplishment, which leads to a better self-efficacy. The more specific a goal, the more specific the outcome (Locke & Latham, 1994). The reason for this is that a vague goal leaves room for numerous possible outcomes, whereas specific goals foster specific outcomes. *Proximity of Goals*

Goals that are near, or proximal, are more motivating for students because it is easier to evaluate progress with a proximal goal than a distant goal. If students feel they are making progress, they will be more motivated to continue until the goal has been met. In effort to make sure that the students are on the correct path to achieving their goals, teachers can establish contracts with the students. The contracts give the students a clear idea of what they are working towards and when the work should be completed. Being part of a contract gives the students more responsibility and greater self-efficacy. Teachers also can set up conferences with students to discuss their goals and how they go about achieving them. This also leads to greater student responsibility.

Difficulty of Goals

Goals that are moderately difficult are more likely to motivate students. If students feel that the goal is too easy, they may not put forth any effort. However, if the goal is somewhat difficult and the students feel that they have the ability to reach it, they may put forth more effort. If the goal is too difficult, students may see themselves as being less than competent and may not put forth a lot of effort.

Intensity of Goals

Intensity refers to the mental effort required to meet a goal. Commitment is a part of goal intensity and refers to how attracted a person is to obtaining a goal: "The ultimate proof of goal commitment is the taking of action" (Locke & Latham, 1994, p. 16). Goals are usually attained when goal commitment is high. Goals that are set by a person, as well as goals that are assigned by someone else and given a rational for meeting the goal, are more motivating than goals that are assigned with no sense of their importance (Locke & Latham, 1994). Students are more likely to set goals in which they are interested, therefore, making them more attainable. In order to achieve goals, students must think they are capable and that the goals are important.

Goals and Affect

The more successful students are at attaining a goal, the more satisfied they are with their performance. Satisfaction, and other emotional responses, come from the value judgments students place on a task. If students believe the goal to be important, then the success or failure that they experience is much more intense than that compared to the success of failure experienced when trying to attain a less important goal.

Goals and Attributes

Students construct attributions for their successes and failures. The most common attributions are ability, effort, task difficulty, and luck (Weiner, 1985). Success-oriented students view being successful as having to do with effort, not ability. Success-oriented students see being successful at a task as a result of effort, and failing at a task as not having put forth the right amount or kind of effort. Failure-avoiding students view being successful as having to do with luck or an easy task (Carr, Borkowski, & Maxwell, 1991; Rueda & Dembo, 1995).

Teachers should be aware of how their students attribute their successes and failures (Ames, 1990). For example, consider a situation in which a teacher continuously tells students that their poor performance is due to their lack of effort. In reality, however, some of the students feel as though they are, in fact, working up to their highest ability. This student-teacher conflict can lead to a decrease in self-efficacy, and possibly learned helplessness. Also, teachers who send the message that maximum effort is required to complete tasks can discourage students because the students may feel that they will not succeed if they have to work so hard. Teachers should instead motivate students to use reasonable amounts of effort.

Conclusion

Goals play a large role in preservice teacher education because goals affect students' thoughts, feelings, and motivation — both intrinsic and extrinsic (Schutz, Crowder, & White, 2001; Singer 1990). Goals influence students' perceptions of persistence and how much it takes to be successful. Goals represent what students would like to happen and what they would like to keep from happening. Students' day-to-day activities are oriented towards achieving subgoals, which in turn are oriented towards attaining career goals, such as wanting to become a teacher. Self-regulation and the use of appropriate teaching and learning strategies are keys to achieving these subgoals and career goals.

The Present Study

There is a need for more empirical evidence that documents the effectiveness of written cases in facilitating preservice teachers' understanding of pedagogical concepts. Furthermore, there is a need for more empirical evidence to support existing guidelines on how cases should be designed to facilitate the transfer of knowledge from one case to a related case. The purpose of the present study, therefore, is to document the effectiveness of written cases in helping preservice teachers learn strategies from one case (an "analog" closed case) and transfer them to a related one (a "target" open-ended case). A related purpose is to shed light on the conditions that foster the transfer of knowledge. Consistent with a constructivist view of learning and transfer, the conditions that were examined included both characteristics of the preservice teachers as well as characteristics of the cases.

The present study is built upon the assumption that written cases can provide instructional scaffolding for preservice teachers and provide a rich, situated context for learning and transfer in an educational area of critical importance, motivating students to learn. The present study is also built upon the assumption that future teachers' practices are influenced by their own experiences while learning (Dana, Campbell, & Lunetta, 1997).

The present study includes two experiments with cases that require solutions to motivational dilemmas. In Experiment 1, it is hypothesized that a significant relationship exists between the goal orientation of preservice teachers and their construction of solutions to motivational dilemmas. Specifically, it is expected that those preservice teachers who have high intrinsic motivation (mastery orientation) will tend to construct a greater number of valid intrinsic-motivation solutions. It is also hypothesized that preservice teachers who are provided with an analog closed case (with examples of both intrinsic and extrinsic motivation solutions) will construct significantly more solutions when transferring to a target open-ended case than preservice teachers who are provided with a no-analog control passage. Finally, it is hypothesized that preservice teachers who are first provided an analog closed-case with solution examples might, as a result, perceive the target open-ended case to be more interesting, understandable, and explainable.

In Experiment 2, it is hypothesized that preservice teachers will construct significantly more solutions when the analog closed case and the open-ended target case have similar contexts and similar solutions. It is also hypothesized that providing teachers with intrinsic-motivation examples will lead to more intrinsic-motivation solutions. Likewise, the provision of extrinsic-motivation examples will lead to more extrinsic-motivation solutions.

These hypotheses are based on the following theoretical rationale. Analog closed cases are expected to enhance the learning and transfer of solutions by providing *instructional scaffolding* (Mayer, Mautone, & Prothero, 2002). Specifically, the analog closed case would help the preservice teachers to create conceptual links with the target case. As a result, the solution principles would become better represented in the preservice teachers' memories, in a fashion consistent with a propositional network model of cognitive architecture that emphasizes the role of analogical reasoning (Anderson, 1993; Salvucci & Anderson, 2001). And second, an analog closed case is expected to increase the preservice teachers' perceptions that the open-ended target case is situationally interesting (Ainley, Hidi, & Berndorf, 2002; Alexander & Jetton, 1996), understandable (Spires & Donley, 1998), and explainable (Mayer, 1992; Moreno & Mayer, 2000). According to Wolters' (1998) model of self-regulation, these perceptions are fostered by situational contexts that are believed to be personally relevant (meaningful) to a learning task. An analog closed case could create such contexts by presenting example solutions in a similar context.

CHAPTER III

EXPERIMENT 1

Experiment 1 compared an analog closed case, containing examples of both intrinsic and extrinsic solutions, with a no-analog control to determine the effects on the construction of solutions to motivational dilemmas. Experiment 1 also examined the relationship between the preservice teachers' goal orientation and the construction of solutions.

Participants

There were a total of 43 preservice teachers, all of whom were enrolled in undergraduate educational psychology classes at either the University of Georgia (n = 25), Athens, Georgia or Western Carolina University (n = 18), Cullowhee, North Carolina. The preservice teachers included 32 female and 11 males and were representative of the university populations. The University of Georgia has 33,878 students: 87% Caucasian, 6.3% African American, 2.9% Asian American, 1% Hispanic American students, 0.2% American Indian, and 2.6% in other groups. Western Carolina University has 8,396 students: 90% Caucasian, 5.6% African American, 1.9% Native American, 1.2% Hispanic American, 0.8% Asian American, and 0.5% in other groups.

The preservice teachers in both universities were randomly assigned to conditions and were examined in groups. Prior to case study, the preservice teachers responded to 31 items from the *Motivated Strategies for Learning Questionnaire* (MSLQ) developed by Pintrich, Smith, Garcia, and McKeachie (1991). The preservice teachers had not yet studied the topic of motivation in their educational psychology classes.

Each preservice teacher then studied a given case. The preservice teachers were asked to study the case until time was called. They were told that they would be asked to try to recall the facts from the case. The analog closed case group read a case based on a student named Nancy who was experiencing a motivation problem in her 9th grade algebra class (see Appendix B). The case explained that Nancy's teacher tried to help increase Nancy's motivation to learn algebra by providing both intrinsic and extrinsic solutions. The no-analog control group studied a passage about standardized testing (see Appendix C) excerpted from Woolfolk's (2004) *Educational Psychology* textbook. The passage was related to educational psychology, but was not on the topic of motivation. After studying a case or passage, all preservice teachers were asked to respond to cloze tests that corresponded to what they had read and studied (see Appendicies D and E). The cloze test was administered to confirm that all preservice teachers studied in earnest.

One week later, all preservice teachers received the same open-ended target case. The preservice teachers were asked to study the case. The open-ended case was based on a student named Susan who was experiencing a motivation problem in her 7th grade geometry class (see Appendix F). After studying the case, the preservice teachers were instructed to describe in writing strategies that Susan's geometry teacher could use to help Susan become a more motivated learner. The preservice teachers were also asked to rate each of their strategies, on a scale of A to F, on how effective they thought each strategy would be if actually implemented. In addition, the preservice teachers were asked to use a given Likert scale to indicate how interesting they found the case, how well they understood the case, and how well they could explain the case to another preservice teacher (see Appendix G).

The number of preservice teachers needed was estimated to be 40 in order to provide a power of .80 at an alpha level of .05. All 43 preservice teachers met or exceeded the criterion of

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50% or more recall on the cloze tests. Thus, the final number of preservice teachers included in the analysis was 43: there were 23 preservice teachers who read the analog closed case and 20 preservice teachers who read the no-analog case.

Materials and Measures

The motivational concepts of the cases are routinely taught by educational psychology instructors and covered in educational psychology college textbooks read by preservice teachers. In college textbooks, these concepts are sometimes presented in the context of cases.

Motivated Strategies Learning Questionnaire (Duncan & McKeachie, 2005; Pintrich, Smith, Garcia, & McKeachie, 1991; VanderStoep & Pintrich, 2003). The questionnaire contains a total of 81 items that are divided into 15 subscales. These subscales can be given together or singly. The 31 items administered in this experiment were from six subscales, to address the present hypotheses, only the 4-item intrinsic-motivation and the 4-item extrinsic-motivation scales were included in the analyses.

<u>Cases</u>. The closed analog case and the open-ended target case were modeled after those in Woolfolk (2004), the most widely adopted college textbook in educational psychology. The cases conformed to the principles of case writing presented in Koballa and Tippins (2004). The readability scores are listed with each case in the Appendices.

<u>Case questionnaire</u>. Items were administered after the open-ended target case in each instance to measure preservice teachers' perceptions of interest (e.g., "My personal interest in this case is..."), understanding (e.g., "My understanding of this case is..."), and explicability (e.g., "If I were to explain this case to another preservice teacher, the quality of my explanations would be..."). The response alternative for each item was on a Likert-type 7-point scale, ranging from very low (1) to very high (7).

<u>Scoring</u>. Based on the coverage in the educational psychology textbook (Woolfolk, 2004), a scoring rubric was developed to identify the preservice teachers' valid intrinsic and extrinsic motivation solutions.

Scoring Rubric: Motivation Solutions

An *extrinsic motivation solution* identifies a behavior that results in the attainment of an externally administered reward. Examples of extrinsic motivators include: pay, prizes, awards, "points," material possessions, social prestige, and positive evaluations from others.

An *intrinsic motivation solution* identifies a behavior performed for its own sake rather than to obtain material or social reward (reinforcer). Examples of intrinsic motivators include: challenge, autonomy, variety, responsibility, achievement, personal control, task identity, informative feedback, and need for competence.

To ensure reliability and content validity, the rubric and responses were examined independently by two education professors who scored the preservice teachers' answers to determine interrater reliability, r = .96; the differences were resolved through discussion. Procedure

Prior to the first session, two sets of packets were assembled. The packets in the first set included a consent form (see Appendix H), information sheet (see Appendix I), MSLQ, analog closed case, and a cloze test. The packets in the second set contained a consent form, information sheet, MSLQ, no-analog control case, and a cloze test.

The two sets of packets were randomly distributed to the preservice teachers. The preservice teachers were informed that this would be the first of two sessions. They were informed that they would be asked to provide information about themselves, such as their major,

past or current professional work experience, and special teaching, research, or other interests related to the course. The preservice teachers were informed that they would be asked to read and study the case in their packet. In addition, the preservice teachers were told that they would then be asked to recall many of the facts they read in the case.

After the consent forms were signed, the preservice teachers were given five minutes to complete the information sheet. Then the preservice teachers were given 5-10 minutes to complete the MSLQ. Once all of the preservice teachers had completed the MSLQ, they were instructed to take out of the packet only the sheet labeled "case." They were then given 10 minutes to read and study the case. They were instructed to continue studying if they finished before time was called. At the end of the 10 minutes, the preservice teachers were instructed to stop reading and place the case back in the packet. All preservice teachers had finished reading, and no one needed more time. The preservice teachers were then asked to take out the cloze test and to fill in the blanks with the correct words. They were instructed to write synonyms if they could not recall the exact word.

Session two of Experiment 1 took place one week after the first session. Prior to the second session, one set of packets was assembled. The packets included an open-ended target case and a questionnaire. Each preservice teacher was given a packet. They were informed that they would be given 5 minutes to read the case. After the 5 minutes expired, they were told to take the next 5-10 minutes and follow the directions and respond in writing to the case. They were informed that there were additional directions on the back of the case that were to be followed after they had responded in writing. After the time expired, the preservice teachers were asked to place the case back in the packet and to take out the form labeled "questionnaire." They were asked to respond to the 3 items on the questionnaire. When all preservice teachers were

done, they were asked to put the questionnaire back in the packet. All preservice teachers completed the measures in the allocated time, and no one needed more time to complete the measures. The preservice teachers were then administered a second questionnaire that asked if and how the analog closed case was helpful.

Results and Discussion

In Experiment 1, it was hypothesized that a significant relationship would exist between the goal orientation of preservice teachers and their construction of solutions to motivational dilemmas. To test these hypotheses a series of planned Pearson product-moment correlations were computed. A statistically significant positive relationship was found between the preservice teachers' total scores on the MSLQ and the total number of solutions they constructed, r(43) =+.30, p < .05. In addition, a significant positive relationship was found between the preservice teachers' intrinsic-motivation scores on the MSLQ and the number of intrinsic solutions they constructed, r(43) = +.34, p < .05. As expected, the relationship between the preservice teachers' intrinsic-motivation scores on the MSLQ and the number of extrinsic solutions they constructed was not significant, p > .05. Likewise, the relationships between the preservice teachers' extrinsic-motivation scores on the MSLQ and the number of intrinsic solutions they constructed was not significant, p > .05. Finally, the relationship between the preservice teachers' extrinsic motivation scores on the MSLQ and the number of extrinsic solutions they constructed was not significant, p > .05. This is perhaps due to the low number of extrinsic solutions constructed because it is otherwise reasonable to expect these variables to be related. Samples of the intrinsic and extrinsic motivation solutions constructed by the preservice teachers are in Table 1.

It was also hypothesized in Experiment 1 that preservice teachers who were first provided an analog closed case with examples of both intrinsic and extrinsic solutions would construct significantly more solutions when transferring to a contextually similar open-ended target case. The means and standard deviations of the analog and no-analog control conditions are presented in Table 2.

A planned comparison for independent samples indicated that the total number of solutions constructed in the analog text condition was significantly greater than the total number of solutions constructed in the no-analog control condition, t(41) = 4.58, p < .001. Specifically, significantly more intrinsic solutions were constructed in the analog text condition than in the no-analog control condition, t(41) = 3.12, p < .01, and significantly more extrinsic solutions were constructed in the analog control condition, t(41) = 2.50, p < .05. In addition, a planned comparison for dependent samples indicated that significantly more intrinsic solutions were constructed, t(42) = 6.51, p < .001.

On a questionnaire administered to the 23 preservice teachers in the analog closed case condition, 19 reported that they thought of the analog case when they responded to the openended target case, and 18 of them reported that they found the analog helpful. Their responses are presented in Appendix J.

Finally, it was hypothesized in Experiment 1 that preservice teachers who were first provided a closed analog case with solution examples might, as a result, perceive the open-ended target case to be more interesting, understandable, and explainable. The preservice teachers' mean ratings of interest, understandability, and explicability in the analog and no-analog control conditions are presented in Table 3. Planned comparisons for independent samples indicated that there were no significant differences between the analog and the no-analog control conditions in interest, understandability, all p's > .05. The no-analog control means for these ratings were relatively high, ranging from 4.65 to 6.25 on a 1 to 7 scale, suggesting that the open-

ended target case was viewed as relatively interesting, understandable, and explainable. If the target case were less so, then perhaps the analog case might influence perceptions more.

In conclusion, the findings of Experiment 1 support the hypothesis that a significant relationship exits between the goal orientation of preservice teachers and their construction of valid solutions to motivational dilemmas. In particular, those teachers who have high intrinsic motivation, reflecting a mastery orientation, tend to construct a greater number of intrinsic motivation solutions. In addition, the findings of Experiment 1 also support the hypothesis that the provision of an analog closed case (with intrinsic and extrinsic solution examples) can help preservice teachers to construct a greater number of valid solutions of both kinds when transferring to a contextually similar open-ended target case. Finally, the preservice teachers in the present study constructed more intrinsic than extrinsic motivation solutions, perhaps suggesting a preference for the former. This preference was reflected in some of the comments made by preservice teachers when explaining how the analog closed case helped them to construct solutions.

Table 1

Samples of Solutions Constructed by the Preservice Teachers

Intrinsic Motivation Solutions

Sample 1: "Susan is a member of the drama club and enjoys acting, singing, and dancing. Perhaps Ms. Thomas could get with the drama teacher and allow geometry students to take measurements to help build a stage/set for a play."

Sample 2: "Relate geometric concepts to aspects of her sports, such as a baseball diamond for softball or the uneven bars for gymnastics."

Sample 3: "You could sit down with the student and explain the importance of geometry in the real world. You could take her on trips to visit people who use geometry in their professions." *Sample 4*: "The teacher could start a learning/study group that Susan could go to to receive help from peers who are motivated and do well in geometry."

Sample 5: "The geometry teacher may want to assign Susan to another student in class who is doing better in geometry. This means pairing students together according to ability. The teacher doesn't even need to announce why the students are working in groups. This may benefit Susan as well as other students."

Sample 6: "Set Susan up for success by allowing her to demonstrate the problems she does correctly, this will shift the focus off of her mistakes."

Sample 7: "Susan says it's hard for her. This makes her not interested in the work. Maybe the teacher could give her easier problems to start with and use "scaffolding." Susan needs the confidence in getting the problems, therefore, she would care to do more and to learn more." *Sample 8*: "Since Susan told Ms. Thomas that she does better in subjects like language arts and social studies (things Susan can relate to), perhaps Ms. Thomas could set up scenarios relating to

things Susan is interested in to help her understand why learning geometry is important and how she can relate it back to her own life."

Sample 9: "Maybe the class could go outside to the softball field and do an activity there. For example, measure the angles between the bases."

Sample 10: "Since Susan participates in gymnastics, perhaps Ms. Thomas could use the concept of the mats, bars, etc. that are geometric figures. Somehow, Ms. Thomas could ask students to build a replica of gymnastics competition. The students could measure angles and such."

Extrinsic Motivation Solutions

Sample 1: "The teacher could offer some kind of reward (pizza party, extra credit points, etc.) for students in the class who attend regularly, do their work—whether it's right or wrong—just look for some effort, and who shows some form of improvement in the subject."

Sample 2: "One strategy I would use would be to use removal punishment and remove a sports activity until she can pull up her grades."

Sample 3: "She could provide rewards for Susan's good test scores such as a homework pass, an extra credit point on a test, or maybe start with smaller assignments that still give Susan enough practice, but gradually build up to larger ones so she doesn't feel easily overwhelmed." *Sample 4*: "Maybe the teacher could create a contingency contract in which Susan has to complete her homework, and if she doesn't complete her homework, she has to face the consequences of some type of presentation or removal punishment."

Sample 5: "Positive reinforcement token system: She can earn tokens to earn the privilege to go to a play or dance."

Sample 6: "Susan could be offered a reward if she brings her grades up. The teacher could offer her something or even get her parents involved and have them agree to do something for her if she brings her grades up."

Sample 7: "Involve her coaches in her academics. Basically, if she keeps skipping class and doing poorly on her schoolwork, she shouldn't be able to play in the next game. If she improves in any way, she gets to play."

Sample 8: "Talk to her to find out if her activities are too much and have the coaches punish her for not coming to class or doing assignments."

Sample 9: "Ms. Thomas could talk to Susan's parents to come up with some rewards Susan could earn at home for her completing assignments and getting good grades on tests." *Sample 10*: "Ms. Thomas could set up a reward system that would encourage Susan to try and complete her homework. She could start out rewarding Susan for doing simple things, such as completing homework and coming to class, and gradually move up to doing well on quizzes and tests."

Table 2

Experiment 1: Solutions Constructed

		Solutions Constructed	<u> </u>	
Condition	Intrinsic	Extrinsic	Total	
Analog				
М	5.70	2.00	7.70	
SD	2.58	1.88	2.55	
No-analog Control				
М	3.40	.85	4.25	
SD	2.19	.88	2.36	

Note. Means are based on *n*'s of 23 and 20 respectively.

Table 3

Experiment 1: Ratings of Target Case

	Ratings of Target Case			
Condition	Interest	Understandability	Explainability	
Analog				
М	5.04	6.39	5.91	
SD	1.43	.84	.90	
No-analog Control				
М	4.65	6.25	5.70	
SD	1.79	1.12	1.26	

Note. Means are based on *n*'s of 23 and 20 respectively. Possible range of ratings was 1 to 7.

CHAPTER IV

EXPERIMENT 2

Experiment 2 was designed to assess the effects of analog context (similar or dissimilar), and example-solutions provided (intrinsic or extrinsic), on the construction of solutions to an open-ended target case.

Participants

The 68 preservice teachers in Experiment 2 were undergraduates enrolled in an educational psychology course at Western Carolina University, North Carolina. These preservice teachers (49 female and 19 male) did not participate in Experiment 1.

Prior to the case study, the preservice teachers were asked to respond to the 31-items from the MSLQ. Each preservice teacher then read and studied a given case. The preservice teachers were asked to continue reading and studying the case until time was called. They were told that they would be asked to recall the facts from the case. In the condition with the similar context, intrinsic-solutions analog closed case (see Appendix K), the case was based on a student, Nancy, who was experiencing motivation problems in her 9th grade algebra class. The case explained that Nancy's teacher tried to help increase Nancy's motivation to learn algebra by providing intrinsic-motivation solutions. The condition with the similar context, extrinsic-solutions analog closed case (see Appendix L), the case was also based on a student, Nancy, who was experiencing motivation problems in her 9th grade algebra class. However, this case explained that Nancy's teacher tried to help increase Nancy's motivation to learn algebra by providing motivation problems in her 9th grade algebra class. However, this case explained that Nancy's teacher tried to help increase Nancy's motivation to learn algebra by providing motivation problems in her 9th grade algebra class. However, this case explained that Nancy's teacher tried to help increase Nancy's motivation to learn algebra by providing extrinsic-motivation solutions. In the condition with the dissimilar context, intrinsic-

solutions analog closed case (see Appendix M), the case was based on a student, Jean, who was experiencing motivation problems in her 8th grade physical science class. The case explained that Jean's teacher tried to help increase Jean's motivation to learn physical science by providing intrinsic-motivation solutions. Finally, in the dissimilar context, extrinsic-solutions analog closed case (see Appendix N), the case also was based on Jean, who was experiencing motivation problems in her 8th grade physical science class. Jean's teacher tried to help Jean by providing extrinsic solutions. After case study, all preservice teachers were asked to respond to a cloze test that corresponded to the case that they studied (see Appendix O, 1-4).

One week later, all preservice teachers received the same open-ended target case. The preservice teachers were asked to study the case. The open-ended case was based on a student named Susan who was experiencing a motivation problem in her 7th grade geometry class (see Appendix F). After studying the case, preservice teachers were instructed to describe in writing strategies that Susan's geometry teacher could use to help Susan become a more motivated learner. The preservice teachers were asked to use a given Likert scale to indicate how interesting they found the case, how well they understood the case, and how well they could explain the case to another preservice teacher (see Appendix G).

Materials and Measures

In general, the materials and measures of Experiment 2 were similar to those of Experiment 1. Where differences exist, these are pointed out in the following sections.

Motivated Strategies Learning Questionnaire (Pintrich, Smith, Garcia, & McKeachie, 1991). The 31-items administered in Experiment 1 were again administered in Experiment 2. The 4-item intrinsic-motivation scale and the 4-item extrinsic-motivation scale were included in the present analyses.

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<u>Cases</u>. The similar context analog cases (with intrinsic solutions and extrinsic solutions), the dissimilar context analog cases (with intrinsic and extrinsic solutions), and the open-ended target case were modeled after those in Woolfolk (2004), the most widely adopted college textbook in educational psychology. The cases conformed to the principles of case writing presented in Koballa and Tippins (2004).

<u>Case questionnaire</u>. Items were administered after the open-ended target case in each instance to measure preservice teachers' perceptions of interest (e.g., "My personal interest in this case is..."), understanding (e.g., "My understanding of this case is..."), and explicability (e.g., "If I were to explain this case to another preservice teacher, the quality of my explanations would be..."). The response alternatives for each item was on a Likert-type 7-point scale that consists of very low to very high.

<u>Measures</u>. The scoring rubric used in Experiment 1 was again used to identify preservice teachers' valid intrinsic and extrinsic motivation solutions. To ensure reliability and content validity, the responses were examined independently by two education professors who scored the preservice teachers' answers to determine interrater reliability, r = .98; the differences were resolved by discussion.

Procedure

Prior to the first session, four sets of packets were assembled. All packets included a consent form, information sheet, and a MSLQ. In addition, the first packet included a similar context analog case with intrinsic solutions and a cloze test. The second packet included a similar context analog case with extrinsic solutions and a close test. The third packet included a dissimilar context case with intrinsic solutions and a cloze test. The fourth packet included a dissimilar context case with extrinsic solutions and a cloze test. The fourth packet included a

The four sets of packets were randomly distributed to the participants. The participants were informed that this would be the first of two sessions. The information provided to participants and procedures followed were the same as in Experiment 1.

Results and Discussion

In Experiment 2, it was hypothesized that the preservice teachers' would construct significantly more solutions when the closed analog case and the open-ended target case had similar contexts and similar solutions. It was also hypothesized that the preservice teachers would construct significantly more solutions when they were provided with only intrinsic-solution examples—and more extrinsic-solutions, when they were provided with only extrinsic solution examples. The means and standard deviations of the intrinsic and extrinsic solutions constructed in the two conditions, analog context (similar or dissimilar) and solution provided (intrinsic or extrinsic), are provided in Table 4.

Because the preservice teachers in Experiment 2 received closed analog cases in all conditions, differences in total solutions were not expected, nor were they found. A two-way analysis of variance performed on the total solutions revealed no significant effects due to context, F(1, 64) = 1.23, solution provided, F(1,64) = .07, or the interaction, F(1,64) = 2.12, all p's > .05. A similar analysis performed on the intrinsic solutions, however, indicated that there was a statistically significant main effect for the solution-provided condition, F(1, 64) = 4.84, p < .05, MSE = 21.45, such that more intrinsic solutions were constructed following the provision of intrinsic solutions (M = 4.40) than extrinsic solutions (M = 3.26). The main effect for context, F(1, 64) = 1.48, MSE = 6.58, and the interaction effect, F(1, 64) = 1.23, p < .05, MSE = 5.46, were not significant, both p's > .05.

A two-way analysis of variance performed on the extrinsic solutions indicated that there was again a statistically significant main effect for the solution-provided condition, F(1, 64) = 5.16, p < .05, MSE = 16.87, such that more extrinsic solutions were constructed following the provision of extrinsic solutions (M = 2.18) than intrinsic solutions (M = 1.17). The main effect for context, F(1, 64) = .03, MSE = .11, and the interaction effect, F(1, 64) = .11, p < .05, MSE = .36, were not significant, both p's > .05. On a questionnaire administered after the experiment to the 68 preservice teachers, 53 reported that they thought of the analog case when they responded to the open-ended target case, and 43 of them reported that they found the analog helpful. Their responses are presented in Appendix J.

Finally, in Experiment 2, it was hypothesized that preservice teachers who were first provided an analog closed case with solution examples might, as a result, perceive the openended target case to be more interesting, understandable, and explicable. The preservice teachers' mean ratings of interest, understandability, and explicability in the context and solution-provided conditions are presented in Table 5. Two-way analyses of variance revealed no significant main effects or interaction for these ratings, all p's > .05, as was the case in Experiment 1.

In conclusion, the findings of Experiment 2 support the hypothesis that the provision of example solutions in an analog closed case increases preservice teachers' construction of similar solutions in an open-ended target case: An intrinsic-motivation example led to more intrinsic-motivation solutions and vice versa. The increase occurred even when the target case was presented one-week later, with no connection drawn to the earlier analog case. Despite this increase, the preservice teachers still constructed more intrinsic-motivation solutions overall, as was the case in Experiment 1, again suggesting a preference for intrinsic solutions. This

preference was seen in some of the comments made by the preservice teachers when explaining how the analog closed case helped them to construct solutions.

There was no support for the hypothesis that similarity of context between the analog closed case and the open-ended target case would help preservice teachers construct more solutions. One explanation for this is that the time interval of one-week was not long enough to make a context difference influential. With a longer interval, say of one month, the inherent advantage of a similar context might manifest itself. Another explanation is that the dissimilar context was not dissimilar enough (from the similar context). Both were educational contexts, differing only by the content area (science versus mathematics) involved. With a much different context (e.g., education versus business), perhaps a context advantage might become apparent. Both explanations should be explored in future studies.

Table 4

Experiment 2: Solutions Constructed

	Solutions Constructed		
Condition	Intrinsic	Extrinsic	Total
Similar Context			
Intrinsic Solutions Provided			
М	5.00	1.20	6.20
SD	2.39	1.47	2.21
Extrinsic Solutions Provided			
М	3.29	2.06	5.35
SD	2.11	2.28	2.47
Dissimilar Context			
Intrinsic Solutions Provided			
М	3.80	1.13	4.93
SD	2.37	1.64	2.02
Extrinsic Solutions Provided			
М	3.24	2.29	5.52
SD	1.64	1.71	1.37

Note. Means are based on *n*'s of 15, 17, 15, and 21 respectively.

Table 5

Experiment 2: Ratings of Target Case

Condition	Interest	Understandability	Explainability
Similar Context			
Intrinsic Solutions Example			
Μ	3.73	6.00	5.33
SD	1.75	1.13	1.35
Extrinsic Solutions Example			
Μ	4.35	6.06	5.35
SD	1.66	1.03	.86
Dissimilar Context			
Intrinsic Solutions Example			
Μ	4.60	6.40	5.87
SD	1.99	.74	.99
Extrinsic Solutions Example			
Μ	4.71	6.29	5.71
SD	1.59	.78	1.01

Note. Means are based on *n*'s of 15, 17, 15, and 21 respectively. Possible range of ratings was 1 to 7.

CHAPTER V

GENERAL DISCUSSION AND IMPLICATIONS

The purpose of the present study, therefore, was to document evidence for the effectiveness of written cases in solving motivational dilemmas and to shed light on the conditions that foster the transfer of knowledge from one case to a related one. Consistent with a constructivist view of learning and transfer, the conditions that were examined in the present study included both characteristics of the preservice teachers themselves as well as characteristics of the cases.

Individual Differences

One important finding concerned the role that individual differences can play in constructing solutions to cases. While causal inferences should be drawn with caution, the present findings suggest that preservice teachers who are highly motivated themselves, as indicated by their total scores on the MSLQ, tend to construct a greater number of valid solutions to motivational dilemmas. And, more specifically, the preservice teachers who have high intrinsic motivation, as indicated by their scores on the intrinsic-motivation scale of the MSLQ, tend to construct a greater number of intrinsic-motivation solutions. This is important because intrinsic motivation is considered to be particularly important by educators: "Research indicates that intrinsically motivated students achieve higher than those who are only extrinsically motivated" (Eggen & Kauchak, 2004, p. 350). This is also important because preservice teachers who are intrinsically motivated themselves may foster intrinsic motivation in their students.
Some typical intrinsic-motivation solutions constructed by the preservice teachers (PST) were:

I think the teacher should try to relate the class material to things that Susan does well or is interested in, such as, softball, dancing, and gymnastics. (PST 34)

Since Susan told Ms. Thomas that she does better in subjects like language arts and social studies (things Susan can relate to), perhaps Ms. Thomas could set up scenarios relating to things Susan is interested in to help her understand why learning geometry is important and how she can relate it back to her own life. (PST 111)

In contrast, some typical extrinsic-motivation solutions constructed by the preservice teachers were:

She could provide rewards for Susan's good test scores such as a homework pass, an extra credit point on a test, or maybe start with smaller assignments that still give Susan enough practice, but gradually build up to larger ones so she doesn't feel easily overwhelmed. (PST 33)

Maybe the teacher could create a contingency contract in which Susan has to complete her homework, and if she doesn't complete her homework, she has to face the consequences of some type of presentation or removal punishment. (PST 23)

Extrinsic motivation is considered to be important by educators, but usually in a supporting role to intrinsic motivation, as explained by Sternberg and Williams (2000):

Extrinsic motivation works particularly well for young students, and teachers of grade school students recognize this fact when they create systems of rewards, such as gold stars, points, or tokens, to get students excited about learning. But as students grow older, they must develop intrinsic motivation. If they do not develop motivation from within, they will never experience or develop the joy of learning. (p. 236)

Taken together, the individual-difference findings suggest that preservice teachers who are highly motivated to learn are better at constructing valid solutions, particularly intrinsicmotivation solutions, to motivational dilemmas. These findings imply that "motivation to learn" is an essential characteristic of those preservice teachers who become adept at encouraging others to learn.

Closed Analog Cases

Another important finding was that studying "closed" analog cases helped preservice teachers construct a greater number of valid solutions to motivational dilemmas in "open-ended" target cases. This finding empirically documents the effectiveness of using written cases in an instructional context where one week separated the cases and the preservice teachers were not informed that the cases were related. Most of the preservice teachers reported in subsequent interviews that they connected the cases on their own and found the analog closed cases to be helpful. For example, some typical comments by the preservice teachers were:

The earlier case helped me to respond to the second case because it refreshed my memory when reading the second case. Both cases were similar, therefore, I recalled certain points from each case that were similar in discussing helpful strategies. (PST 100) When you read or hear ideas, they stick in your memory in some form. Reading about a problem and what one person did — then later asked what you would do — for some reason, what you read or heard is the first idea that pops into your head. (PST 82)

The preservice teachers' comments also shed light on how the specific solutions provided in the analog cases facilitated the construction of solutions to the open-ended target cases. Some typical comments along these lines were:

The earlier case helped because it included solutions to the problem. This helped me and even helped me brainstorm more solutions. It really made the thought process flow and expand. (PST 104)

By evaluating both cases I was able to compare and contrast the two cases. I was able to modify the educational strategies that had been supplied to me in the first case to implement for the second. The first case served as an example and the second allowed me to execute. (PST 11)

The preservice teachers' comments suggest that their case-based reasoning included reflection and analogical inferences. Case-based reasoning allows students to reflect on what they have learned and how this could be helpful in solving dilemmas. This reflection period encourages analysis, encoding, and elaboration which makes the experience and what was learned helpful and accessible (Kolodner, 1997).

When preservice teachers were provided with both intrinsic and extrinsic motivation examples, as they were in the closed analog case of Experiment 1, more intrinsic solutions were constructed than extrinsic ones, perhaps reflecting a preference for intrinsic solutions. Such a preference was reflected in comments by the preservice teachers such as: "I remember that the cases were similar and that the solutions involved rewards if the students did well; I do not remember using rewards to help the students because it is not the policy I would use myself" (PST 13) and "I don't like to think of a student being motivated by tangible rewards" (PST 53). Even when preservice teachers received no examples in the no-analog control of Experiment 1, more intrinsic solutions were constructed than extrinsic ones.

In Experiment 2, however, the kind of example solution in the closed analog case influenced the kind of solutions the preservice teachers constructed for the open-ended target case. The preservice teachers who received intrinsic examples increased the number of intrinsic solutions they constructed relative to extrinsic solutions and vice versa. This finding indicates that even if preservice teachers typically prefer to construct intrinsic motivation solutions, the kind of solution they construct can be influenced by what is provided them in a closed analog case. This has important instructional implications because the best solution to a motivational dilemma may not always be an intrinsic one. For example, some authorities agree that extrinsic motivators, such as praise, can serve as a form of feedback to let students know that their efforts are effective (Chance, 1992, 1993) and that this feedback can actually enhance intrinsic motivation solution might be better and, in these circumstances, a closed analog case could be designed to provide an exemplary one.

Theoretical Perspective

From a theoretical perspective, the findings suggest that closed analog cases can provide instructional scaffolding for preservice teachers and provide rich, situated contexts for learning (Mayer, Mautone, & Prothero, 2002). Specifically, a closed analog case can help preservice teachers by creating conceptual links with an open-ended target case. As a result, solutions become better represented in preservice teachers' memories, in a fashion consistent with a propositional network model of cognitive architecture that emphasizes the role of analogical reasoning (Anderson, 1993; Salvucci & Anderson, 2001).

This interpretation of the cognitive mechanisms that underlie case-based instruction is consistent with a constructivist philosophy in which students solve instructional problems by reflecting on their experiences and transferring relevant knowledge from familiar situations to new ones. Case-based instruction is an experiential type of learning and constructivists believe that active, experiential learning is particularly effective (Paris & Newman, 1990; Welty, 1989). This interpretation is also consistent with the view that preservice teachers' future instructional practices are based on those they experience during their years of preparation (Dana, Campbell, & Lunetta, 1997).

Future Research

One limitation of the present study was that there was only a one-week interval between studying the analog closed case and constructing solutions to the open-ended target case. There is a need for future studies that extend the time interval to better understand the conditions under which case-based knowledge transfers.

Another limitation of the present study is that the cases were only written simulations of motivational dilemmas and responses. An important direction for future research is to use technology to create media environments that more closely approximate the contexts in which real-life dilemmas and responses occur (Spiro, Collins, Thota, & Feltovich, 2003).

While this study empirically examined case-based instruction for preservice teachers, more empirical studies are needed that develop, refine, and validate models of implementation. Valid models that provide guidelines for case-based instruction should be based on a solid foundation of empirical research. The evaluation of the preservice teachers' responses to motivational dilemmas in the present study were consistent with the content presented in a leading educational psychology textbook (Woolfolk, 2004). Future research should design and evaluate cases based, not only on the content of leading textbooks, but on the responses of experienced, exemplary teachers.

Conclusion

The findings of the present study support written case-based instruction, an approach in which preservice teachers analyze dilemmas that are typically encountered in the teaching profession. Case-based instruction is recommended because this method helps preservice teachers to build upon their existing knowledge and anchor their learning in meaningful contexts. The present findings suggest that current practices of how preservice teachers learn to solve motivational dilemmas should be adapted to take advantage of written case studies in a more systematic way.

In conclusion, carefully crafted case studies can improve the likelihood that preservice teachers will transfer relevant knowledge to new situations. Case-based instruction can help preservice teachers to become truly exemplary teachers.

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APPENDIX A

MOTIVATED STRATEGIES LEARNING QUESTIONNAIRE

The following questions ask about your motivation for and attitudes about your college courses. Remember there are no right or wrong answers. Answer the questions about how you study for your college courses as accurately as possible. Use the scale below to answer the questions. If you think the statement is very true of you, put a check mark in the circle next to 7; if a statement is not at all true of you, put a check mark in the circle next to 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you.

1 = not at all true of me 2 3 4 5 6 7 = very true of meIn my college courses,

1. I prefer course material that really challenges me so I can learn new things.

01 02 03 04 05 06 07

- 2. If I study in appropriate ways, then I will be able to learn the material.
 - 01 02 03 04 05 06 07
- 3. When I take a test I think about how poorly I am doing compared with other students.
 - O1 O2 O3 O4 O5 O6 O7
- 4. I think I will be able to learn the course material.
 - 01 02 03 04 05 06 07
- 5. I believe I will receive an excellent grade.
 - O1 O2 O3 O4 O5 O6 O7
- 6. I'm certain I can understand the most difficult material presented in the readings.
 - O1 O2 O3 O4 O5 O6 O7
- 7. Getting a good grade is the most satisfying thing for me right now.

O1 O2 O3 O4 O5 O6 O7

8. When I take a test I think about items on other parts of the test I can't answer.

01 02 03 04 05 06 07

9. It is my own fault if I don't learn the material.

01 02 03 04 05 06 07

10. It is important for me to learn course material.

01 02 03 04 05 06 07

11. The most important thing for me right now is improving my overall grade point average, so my main concern is getting a good grade.

O1 O2 O3 O4 O5 O6 O7

12. I'm confident I can understand the basic concepts taught in this course.

O1 O2 O3 O4 O5 O6 O7

13. If I can, I want to get better grades than most of the other students.

01 02 03 04 05 06 07

14. When I take tests I think of the consequences of failing.

O1 O2 O3 O4 O5 O6 O7

15. I'm confident I can understand the most complex material presented by the instructor.

01 02 03 04 05 06 07

16. I prefer course material that arouses my curiosity, even if it is difficult to learn.

01 02 03 04 05 06 07

17. I am very interested in the content area.

O1 O2 O3 O4 O5 O6 O7

18. If I try hard enough, then I will understand course material.

01 02 03 04 05 06 07

19. I have an uneasy, upset feeling when I take an exam.

01 02 03 04 05 06 07

20. I'm confident I can do an excellent job on the assignments and tests.

01 02 03 04 05 06 07

21. I expect to do well.

01 02 03 04 05 06 07

22. The most satisfying thing for me is trying to understand the content as thoroughly as possible.

O1 O2 O3 O4 O5 O6 O7

23. I think the course material is useful for me to learn.

O1 O2 O3 O4 O5 O6 O7

24. When I have the opportunity, I choose course assignments that I can learn from even if they don't guarantee a good grade.

O1 O2 O3 O4 O5 O6 O7

25. If I don't understand course material, it is because I didn't try hard enough.

01 02 03 04 05 06 07

26. I like the subject matter.

O1 O2 O3 O4 O5 O6 O7

27. Understanding the subject matter is very important to me.

01 02 03 04 05 06 07

28. I feel my heart beating fast when I take an exam.

O1 O2 O3 O4 O5 O6 O7

29. I'm certain I can master the skills being taught.

O1 O2 O3 O4 O5 O6 O7

30. I want to do well because it is important to show my ability to my family, friends, employer, or others.

O1 O2 O3 O4 O5 O6 O7

31. Considering my skills, the teachers, and the difficulty of the course, I think I will do well.

O1 O2 O3 O4 O5 O6 O7

APPENDIX B

EXPERIMENT 1: ANALOG CLOSED CASE

(Word Count = 536) (Flesch Reading Ease = 67.4) (Flesch-Kincaid Grade Level = 8.4)

Please read and study the following case. If you finish before time is called, please continue to study the case.

Nancy Lyons is a 9th grade student at Riverside High School, which is part of a large suburban school district. The enrollment at Riverside High is 1,616 students, with 427 students in the 9th grade. Riverside High's mascot is the Eagle and sports play an important role in student life there.

Nancy enjoys many sports and is a member of both the school's swimming team and soccer team. Her two younger brothers love to watch her play. Nancy also likes to write poetry, cook, and go shopping with her friends in her spare time.

This year, Nancy is taking algebra. Unfortunately, she isn't very motivated to do well in algebra. She often seems inattentive in class, doesn't turn in most of her homework, sometimes skips class, and, not surprisingly, does poorly on tests. Her algebra teacher, Ms. Jennings, is pretty sure that Nancy could do a lot better in algebra if only she would try harder, so she asked Nancy to stay after school one day to have a one-on-one meeting.

Ms. Jennings began, "Nancy, I'd like to talk with you about how you are doing in my algebra class. Your grades seem to be getting worse and I'm really concerned about it. I want to help you because I know you can do better."

Nancy replied, "I just think algebra is hard to learn. I mean, subjects like history are pretty easy for me, but algebra isn't.

Ms. Jennings asked, "Can you tell me why you think it's so hard? What in particular makes algebra harder for you?"

Nancy thought for a few moments and then said, "Well, I guess what's hard for me is the time it takes to learn algebra. It takes a lot more time for me to do my algebra homework than it does to like, write an essay or read a chapter in history."

Ms. Jennings replied, "Thanks, Nancy. What you've said is really helpful. Let me think about things for a few days and see if I can come up with some strategies to help you out."

After spending a few days thinking about what Nancy had said, Ms. Jennings decided on several specific strategies to help Nancy become more motivated. She tried to make algebra more interesting to Nancy by including problems related to swimming and soccer in some of the homework problems. For a class project, she decided to have students research and present on ways algebra is used in real life settings. Students could choose whatever topic they wanted to research, so Nancy chose to find out how algebra can be used to revise cooking recipes when changing the quantities of ingredients needed for different numbers of people. Ms. Jennings also offered Nancy some tangible rewards for working harder. For example, she made a rule that any student who got a grade of a "B" or better on the next two unit exams would get one of the cool math T-shirts given to the school by the textbook company. After talking with Ms. Jennings, Nancy's parents told her they would take Nancy and some friends to a professional soccer game if she could pull her grade up to a B on the next two unit exams.

APPENDIX C

EXPERIMENT 1: NO-ANALOG CONTROL CASE

(Word Count = 439) (Flesch Reading Ease = 56.5) (Flesch-Kincaid Grade Level = 10.5)

Please read and study the following case. If you finish before time is called, please continue to study the case.

The concept of ranking is the basis for one very useful kind of score reported on standardized tests, a percentile rank score. In percentile ranking, each student's raw score is compared with the raw scores of the students in the norming sample. The percentile rank shows the percentage of students in the norming sample that scored at or below a particular raw score. If a student's score were the same as or better than three-quarters of the students in the norming sample, the student would score in the 75th percentile or have a percentile rank of 75. You can see that this does not mean that the student had a raw score of 75 correct answers or even that the student answered 75% of the questions correctly. Rather, the 75 refers to the percentage of people in the norming sample whose scores on the test were equal to or below this student's score. A percentile rank of 50 means that a students has scored as well as or better than 50% of the norming sample and has achieved an average score.

The attached figure (from Woolfolk, 2004, p. 513) shows percentile rankings on a normal curve and illustrates one caution in interpreting percentile scores. Percentile scores have different meanings at different places on the scale. For example, a difference of a few raw score points near the mean might translate into a 10-point percentile difference, while it would take 6 or 7 points to make a 10-point percentile difference farther out on the scale. Differences in percentile ranks do not mean the same thing in terms of raw score points in the middle of the scale as they

do at the fringes. The graph shows Joan's and Alice's percentile scores on the fictitious Test of Excellence in Language and Arithmetic. Both students are about average in arithmetic skills. One equaled or surpassed 50% of the norming sample; the other, 60%. However, because their scores are in the middle of the distribution, this difference in percentile ranks means a raw score difference of only a few points. Their raw scores were actually 75 and 77. In the language test, the difference in percentile ranks seems to be about the same as the difference in arithmetic, since one ranked at the 90th percentile and the other at the 99th. But the difference in their raw scores on the language test is much greater. It takes a greater difference in raw score points to make a difference in percentile rank at the extreme ends of the scale. On the language test the difference in raw scores is about 10 points.

APPENDIX D

EXPERIMENT 1: ANALOG CLOSED CASE CLOZE TEST

Please read and study the following case. If you finish before time is called, please continue to study the case.

Nancy ______ is a 9th grade student at ______ High School, which is part of a large suburban school district. The enrollment at ______ High is 1,616 students, with _______ students in the 9th grade. Riverside High's mascot is the ______ and ______ play an important role in student life there.

Nancy enjoys many sports and is a member of both the school's ______ team and ______ team. Her two younger ______ love to watch her play. Nancy also likes to write poetry, ______, and go shopping with her friends in her spare time.

This year, Nancy is taking algebra. Unfortunately, she isn't very motivated to do well in algebra. She often seems ______ in class, doesn't turn in most of her homework, sometimes ______ class, and, not surprisingly, does poorly on tests. Her algebra teacher, Ms. Jennings, is pretty sure that Nancy could do a lot better in algebra if only she would try harder, so she asked Nancy to stay after school one day to have a one-on-one meeting.

Ms. Jennings began, "Nancy, I'd like to talk with you about how you are doing in my algebra class. Your grades seem to be getting worse and I'm really concerned about it. I want to help you because I know you can do better."

Nancy replied, "I just think algebra is hard to learn. I mean, subjects like _________ are pretty easy for me, but algebra isn't.

Ms. Jennings asked, "Can you tell me why you think it's so hard? What in particular makes algebra harder for you?"

Nancy thought for a few moments and then said, "Well, I guess what's hard for me is the ______ it takes to learn algebra. It takes a lot more time for me to do my algebra homework than it does to like, write an ______ or read a ______ in history."

Ms. Jennings replied, "Thanks, Nancy. What you've said is really helpful. Let me think about things for a few days and see if I can come up with some strategies to help you out."

After spending a few days thinking about what Nancy had said, Ms. Jennings decided on several specific strategies to help Nancy become more motivated. She tried to make algebra more interesting to Nancy by including problems related to ______ and ______ in some of the homework problems. For a class project, she decided to have students research and present on ways algebra is used in real life settings. Students could choose whatever topic they wanted to research, so Nancy chose to find out how algebra can be used to revise _______ when changing the quantities of _______ needed for different numbers of people. Ms. Jennings also offered Nancy some tangible rewards for working harder. For example, she made a rule that any student who got a grade of a _______ or better on the next _______ unit exams would get one of the cool _______ T-shirts given to the school by the textbook company. After talking with Ms. Jennings, Nancy's parents told her they would take Nancy and some friends to a professional soccer game if she could pull her grade up to a _______ on the next ________ unit exams.

APPENDIX E

EXPERIMENT 1: NO-ANALOG CONTROL CASE CLOZE TEST

Please read and study the following case. If you finish before time is called, please continue to study the case.

The attached figure (from Woolfolk, 2004, p. 513) shows percentile rankings on a normal curve and illustrates one caution in ______ percentile scores. Percentile scores have different meanings at different places on the scale. For example, a difference of a few raw score points near the mean might translate into a 10-point percentile difference, while it would take 6 or 7 points to make a 10-point percentile difference farther out on the scale. Differences in percentile ranks do not mean the same thing in terms of ______ score points in the middle of the scale as they do at the ______. The graph shows Joan's and Alice's percentile scores

on the fictitious Test of Excellence in ______ and Arithmetic. Both students are about average in arithmetic skills. One equaled or surpassed 50% of the ______ sample; the other, 60%. However, because their scores are in the middle of the ______, this difference in percentile ranks means a raw score difference of only a few points. Their raw scores were actually ______ and ______. In the language test, the difference in percentile ranks seems to be about the same as the difference in arithmetic, since one ranked at the 90th percentile and the other at the 99th. But the difference in their raw scores on the language test is much greater. It takes a greater difference in raw score points to make a difference in percentile rank at the extreme ends of the scale. On the language test the difference in raw scores is about

_____ points.

APPENDIX F

OPEN-ENDED TARGET CASE

Susan Grey is in 7th grade at Northwood Middle School, which is located on the outskirts of a metropolitan area. Northwood Middle is a 3-year public school with approximately 1,025 students in grades 6-8. Northwood has gained notoriety due to their superb fine arts program.

Since Susan began 7th grade, she has been a member of the drama club, the softball team, and the gymnastics team. Susan has one brother who attends the neighboring Northwood High School, and is an assistant coach for Susan's softball team. In her free time, Susan enjoys acting, singing, and dancing.

Susan is currently enrolled in a geometry class. Unfortunately, Susan has been struggling with her geometry work and seems to be poorly motivated as evidenced by her sometimes skipping class, not-done assignments, inattention in class, and low-test scores.

Her geometry teacher, Ms. Thomas, is certain that Susan could do much better in geometry, so she asked Susan to stay after school with her one day.

Ms. Thomas started, "Susan, I'd like to talk about your work and how you are doing in my geometry class. I want to help you because I know you can do better. What do you think?"

Susan responded, "Yeah, I realize that I am not doing too well in geometry, but, I just think it's too hard for me."

Ms. Thomas asked, "So why do you think geometry is so hard? What in particular makes it hard for you?"

Susan answered, "The geometry work takes me a long time to complete. Sometimes it seems like it takes me forever. It takes me much longer than it does for me to do my language arts homework or to read a chapter for social studies. Those are a lot easier for me."

Ms. Thomas said, "Thanks Susan for your honesty. Let me think about things for the next few days and see if I can come up with some ways to help you."

Your task is to describe good, specific strategies that Susan's geometry teacher could use to help Susan become a more motivated learner. Describe as many strategies as you can and be sure to explain each one in detail. Please number each of your strategies so that I can tell when one ends and another begins.



APPENDIX G

QUESTIONNAIRE

Please answer the following questions by checking the number that best applies to you.

1 = very low 2 3 4 5 6 7 = very high

My personal interest in the case I just read is

 $\circ 1 \quad \circ 2 \quad \circ 3 \quad \circ 4 \quad \circ 5 \quad \circ 6 \quad \circ 7$

My understanding of the case I just read is

 $\circ 1 \quad \circ 2 \quad \circ 3 \quad \circ 4 \quad \circ 5 \quad \circ 6 \quad \circ 7$

If I were explaining the case I just read to another preservice teacher, the quality of my

explanations would be

 $\circ 1 \quad \circ 2 \quad \circ 3 \quad \circ 4 \quad \circ 5 \quad \circ 6 \quad \circ 7$

APPENDIX H

CONSENT FORM

I, ______, agree to participate in a research study titled " How Preservice Teachers Solve Instructional Dilemmas" conducted by Ashley Owens from the Department of Educational Psychology at the University of Georgia (542-4110) under the direction of Dr. Glynn, Department of Educational Psychology, University of Georgia (542-4249). I understand that my participation is voluntary and consent to have my work used in this research study. I can stop taking part without giving any reason, and without penalty. I can ask to have all of the information about me returned to me, removed from the research records, or destroyed.

The reason for this study is to assess how students respond to cases when the cases contain different information.

If I volunteer to take part in this study, I will be asked to do the following things:

1) Respond to the Motivated Strategies Learning Questionnaire

2) Read a case

3) Read a second case and respond to the case in writing

I understand that the activities in this research study will take approximately 20 minutes for each of the two sessions.

No risk or discomfort is expected.

No information about me, or provided by me during the research, will be shared with others without my written permission except as required by law. I will be assigned a pseudonym and this will be used on my written responses.

The investigator will answer any further questions about the research, now or during the course of the project (542-4110).

My questions have been answered to my satisfaction. I understand that I am agreeing by my signature on this form to take part in this research project and understand that I will receive a signed copy of this consent form for my records.

Name of Researcher	Signature	Date
Telephone: Email:		
Name of Participant	Signature	Date
Please sign both	copies, keep one and return one to th	he researcher.

Additional questions or problems regarding your rights as a research participant should be addressed to Chris A. Joseph, Ph.D. Human Subjects Office, University of Georgia, 612 Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199; E-Mail Address IRB@uga.edu
APPENDIX H

CONSENT FORM

I, ______, agree to participate in a research study titled " How Preservice Teachers Solve Instructional Dilemmas" conducted by Ashley Owens from the Department of Psychology at Western Carolina University (227-7361). I understand that my participation is completely voluntary and I consent to have my work used in this research study. I can stop taking part without giving any reason, and without penalty. I can ask to have all of the information about me returned to me, removed from the research records, or destroyed.

The reason for this study is to assess how students respond to cases when the cases contain different information.

If I volunteer to take part in this study, I will be asked to do the following things:

- 1) Respond to the Motivated Strategies Learning Questionnaire
- 2) Read a case
- 3) Read a second case and respond to the case in writing

I understand that the activities in this research study will take approximately 20 minutes for each of the two sessions.

I will receive the opportunity to attend an out of class study session led by Ashley Owens.

No risk or discomfort is expected.

No information about me, or provided by me during the research, will be shared with others without my written permission except as required by law. I will be assigned a pseudonym and this will be used on my written responses.

The investigator will answer any further questions about the research, now or during the course of the project (227-3365).

My questions have been answered to my satisfaction. I understand that I am agreeing by my signature on this form to take part in this research project and understand that I will receive a signed copy of this consent form for my records.

Name of Researcher	Signature	Date
Telephone: Email:		
Name of Participant	Signature	Date

Please sign both copies, keep one and return one to the researcher.

You may contact the WCU Institutional Review Board at the following address and telephone number at any time during this study should you feel your rights have been violated:

Chairperson, Institutional Review Board c/o Research Administration Office of Research and Graduate Studies 109F University Outreach Center 828-227-7398

APPENDIX I

INFORMATION SHEET

Please print carefully.

- 1. Your name:
- 2. Course prefix and number:
- 3. Telephone number:
- 4. Email address:
- 5. Educational Program:
- 6. Degree working toward:
- 7. Past teaching experience, if any (# years taught, where, grade levels):
- 8. Other past or current professional work experience:
 - 8-a. My position or title:
 - 8-b. Company, business, or organization and its location:
- 9. Special teaching, research, and other professional and personal interests related to this course:
- 10. Hobbies, recreations, interest:

APPENDIX J

PRESERVICE TEACHERS' RESPONSES TO QUESTIONS ABOUT HOW THE ANALOG CASES AFFECTED THEM

Questions Posed to Preservice Teachers Who Received Analog Cases

Question 1: When you wrote strategies that could help Ms. Thomas help Susan with geometry, did you remember anything about the case you read about the week prior? Please check one of the following.

Yes No

Question 2: If you answered "yes" to the previous question, did the earlier case help you respond to the case about Ms. Thomas and Susan? Please check one of the following.

Yes No _____

If you answered "yes" to the previous question, please explain how the earlier case helped you respond to the case about Ms. Thomas and Susan.

Experiment 1

Remembered Analog Case and Considered it Helpful (N = 18)

PST 55: "They were very similar to each other."

PST 56: "The strategies used to help the student in the first scenario would also be effective for

Susan. She and the previous student shared similar traits and difficulties."

PST 57: "It was very easy to remember because the story was the same except some of the words were missing. All I had to do was fill in the blanks with what I read the week before."

PST 80: "The early case helped me because it talks about geometry. I remembered a student who had problems in her geometry class. She told her teacher she was not good in math and her teacher stopped her to talk to her after class. The teacher offered to help her with her math class. The student was pleased to get help."

PST 81: "It helped give me ideas about how to effectively motivate Susan. I also came up with some of my own ideas, but what I read earlier helped me think of more ideas."

PST 82: "When you read or hear ideas, they stick in your memory in some form. Reading about a problem and what one person did -- then later asked what you would do – for some reason, what you read or heard is the first idea that pops into your head. It's why it is so difficult not to plagiarize, etc."

PST 83: "The earlier case helped me respond to the case about Ms. Thomas and Susan because the first case was a good teaching example that seemed to work."

PST 84: "Because the student suffered from similar symptoms, being able to see commonalties in symptoms are very helpful in discriminating how to assess and help the child. Also, there are factors that should set off alarms that something abnormal is occurring with this child." PST 85: "I don't remember much, but when I am given information, I try to use it and apply it to new material. This mental process/learning tactic has worked for me a long time with processing/applying new information."

PST 87: "The earlier case helped with examples of ways to incorporate some of her hobbies or sports into classroom work using word problems, rewards, etc."

PST 100: "The earlier case helped me to respond to the second case because it refreshed my memory when reading the second case. Both cases were similar; therefore, I recalled certain points from each case that were similar in discussing helpful strategies."

PST 101: "In the earlier case study, it gave the examples that the teacher used, so it helped to give an idea of how to handle the problem. I think this is a good thing because the people that are going into teaching will be able to relate back to this so that they can help a student out the same way instead of having the student fail the class."

PST 102: "The earlier case gave background examples and scenarios that gave knowledge and helpful information to be used to form resolutions that are practical."

PST 103: "It put the idea in my head of involving Susan's interests into the work. If it's something she likes and can relate to, she'd be more likely to do it. The first case also offered rewards for doing the work, but this could also make her less likely to do the work if there is not a reward."

PST 104: "The earlier case helped because it included solutions to the problem. This helped me and even helped me brainstorm more solutions. It really made the thought process flow and expand."

PST 105: "I remember how Ms. Thomas had Susan do a project she was interested in, and I also remember how she wrote problems that Susan liked (involving her sport for example). Having already seen solutions, it was easy for me to rewrite them back as answers a week or two later." PST 106: "It really gave me a starting point on what could be done to help the student. It helped me to brainstorm and try to come up with different solutions to the problem. It really set an example for me to follow and expand upon."

PST 107: "It helped me with the case because I could remember the information about motivation (intrinsic, extrinsic)."

*Remembered Analog Case and Did Not Consider It Helpful (*N = 1*)*

PST 99: "I remember that Susan had trouble participating and doing homework. Ms. Thomas asked why Susan was not doing well in class and it was because something about her homework assignments in other classes weren't so time consuming. Ms. Thomas helped out by making the word problems into things Susan could relate to. Since Susan was very athletic, Ms. Thomas made word problems that related to sports."

Did Not Remember Analog Case Nor Found It Helpful (N = 4)

PST 58: [No explanation provided]

PST 59: [No explanation provided]

PST 60: [No explanation provided]

PST 86: "I just thought getting Susan's attention on geometry in a way that interest her is a major suggestion and possibility. She has a lot of interest in other things, try to incorporate the baseball field shapes, number of runs she scores, something to geometry. Also, offer an incentive for her improvement."

Experiment 2

Remembered Analog Case and Considered It Helpful (N = 43)

PST 2: "Thinking about the first case helped me with the second one because they were similar. I could use some of the same strategies that I used in the second."

PST 3: "I did think back. The first case gave me ideas to think about for the second case. I don't remember if I used those ideas in the second case, but they helped."

PST 4: "The earlier case helped me become familiar with the critical thinking in regards to case studies. Therefore, in working with the first case, I had to analyze and think about the issues, which prepared me for the Susan case study."

PST 5: "I think I remember what was important in the fist case (such as what details would have to be remembered). Knowing this, it was easier to know what would be asked after looking at the case. This helped me with the second case."

PST 7: "I used her strategy to help me formulate a response."

PST 8: "Both cases were similar. I used the philosophy of implementing a new teaching style, or just attempting to reach a level of "correctness" or "real-life" applicability for both students." PST 9: "The case was very familiar to the first one. It really helped me to think about the first case."

PST 10: "I read often so I tend to retain information for a few weeks. If we would have talked about the case I would have remembered more. I tend to make connections if the scenarios are similar."

PST 11: "By evaluating both cases I was able to compare and contrast the two cases. I was able to modify the educational strategies that had been supplied to me in the first case to implement for the second. The first case served as an example and the second allowed me to execute."

PST 12: "Yes, I did remember reading the first case. When I read over the second one it helped me write a response."

PST 14: "The earlier case gave me ideas that could work and that helped."

PST 15: "I did recognize the case from before. They looked similar. It helped me see and develop some strategies. I could reflect upon it."

PST 16: "Both of the cases were similar."

PST 17: "I remember doing the second part of the study and the two were related. I thought back to anything I could remember from the first to answer the second."

PST 18: "I remembered reading about the different strategies that were used currently and what Susan's strengths were and how that correlated. Then I thought about how ineffective a lot of the strategies were."

PST 19: "Yes, because I could remember some of the things that Ms. Thomas used to help Susan with her difficulties."

PST 21: "I was familiar with similar problems from the first case so the info wasn't new and I had already thought about it."

PST 22: "Both of these cases were similar so it helped with the second case."

PST 26: "I remembered some strategies used the week before, so I could implement some of the same strategies or ideas."

PST 28: "If memory serves, the cases were fairly similar in terms of how they were worded, so it made recalling the previous information somewhat easier."

PST 29: "I checked yes simply because I remember reading the study. I don't remember minor details. It has been weeks since we read that stuff and I hope you don't think we honestly remember that stuff."

PST 30: "The first case showed us some ideas on how to help Susan in Ms. Thomas' classroom. It showed her hobbies which helped me to come up with ideas to help her in geometry."

PST 31: "I already had some ideas of things that could help her with her science and how to get motivated."

PST 32: "I remembered the strategies that she used. I was able to reuse the info from the previous week."

PST 34: "I had prior knowledge."

PST 35: "The earlier case showed me that Susan was a very active person. It said she plays soccer and was on the swim team. Therefore, I knew she was extrinsically motivated." PST 36: "When I answered the question, I thought back to some of the things that was in the previous weeks case study. I might have added some but I pretty much stole the ideas from the first case. I added some of my own but the first case really helped me with the answer." PST 38: "There were things in the previous case that I read that were very similar to the Ms. Thomas and Susan problem, hence, helping me remember to solve their problem." PST 41: "It gave me insight to the kind of student Susan was and what kind of teacher Ms. Thomas was. It told of outside activities Susan is involved in, as well as hobbies that interest her. It also explained the techniques Ms. Thomas already tried."

PST 43: "I used some of the same motivational strategies in both cases."

PST 44: "It gave me ideas about what to do to motivate the student. Also, I was able to use the information to develop in my mind strategies that would not work."

PST 46: "It gave me ideas on how to get a student that is not motivated about school to change their mind. There are different ways to try to get a child motivated."

PST 47: "The previous case listed solutions. Because this case listed solutions, I already had something to feed off of. Having had previous ideas already planted in your head helped to open up the gate for new ideas to come out."

PST 50: "I remember thinking about how I, as a student, do much better in a class that I am interested in. As a future educator, I feel like happy, comfortable students make much better learners."

PST 51: "It helped give me ideas about how to help a student learn. I remembered that it helps students to do better if they have a topic to work on that interests them. From there I was able to think of others."

PST 52: "Wow, this is hard! I remember feeling sympathy for Susan and how I tried to put myself in Ms. Thomas' situation. I thought of ways to help Susan, like give her an assignment, or make the assignment something she could relate to."

PST 53: "It was basically the same case – geometry student with no motivation."

PST 54: "I remembered some of the main ideas about the earlier case about techniques the teacher can use to help the student. I remembered that the student was having motivation issues, the student said that math was hard and she wasn't understanding it, and that it took more time to finish the homework."

PST 88: "Well, it gave ideas to help her that were ideas from the previous week. For example, connecting the geometry problems to something the student liked, for example, soccer, singing, etc."

PST 89: [No explanation provided]

PST 91: "I didn't consciously think about the earlier case, but it must have influenced me because I came up with external solutions and the earlier case did the same."

PST 93: [No explanation provided]

PST 94: "It gave me ideas on how to motivate a student to work harder and do better in class.

The cases ere very similar so it was easy to make suggestions for the second case based on how the teacher in the first case handled the problem."

*Remembered Analog Case and Did Not Consider It Helpful (*N = 10*)*

PST 1: "I did not compare the first article to the second. I kind of remembered that the scenarios were sort of related, but did not try to relate the cases or anything about them."

PST 13: "I remember that the cases were similar and that the solution involved rewards if the student did well. I do not remember using rewards to help the student because it is not the policy I would use myself."

PST 23: [No explanation provided]

PST 25: "I just thought that the two cases were similar, but I did not really use it to help me on the second case."

PST 27: "When I answered the second question, I remembered reading a case similar before. I

think the post cases were similar. I cannot specifically remember what each one was about."

PST 39: "Honestly, I don't remember too much about the first case. What I do remember is that I

thought Ms. Thomas should orient her lessons around something Susan likes, such as soccer.

This would help Susan enjoy math."

PST 40: [No explanation provided]

PST 48: "The earlier case would have helped me if I didn't already have good training through Dr. Kooper-Duffy in my SPED class on ways to motivate students."

PST 49: "I honestly remember very little from the cases."

PST 111: [No explanation provided]

Did Not Remember Analog Case Nor Found It Helpful (N = 9)

PST 6: [No explanation provided]

PST 20: "When I read the second one, I didn't think back to the first one at all. I am not even sure if they e similar at all."

PST 24: "I don't remember, but we had done a lot of class work that helped me out."

PST 33: "I answer no, but how I decided what would help is what I learned in my special education course I am taking this semester. I also thought of things that would have helped me if I was in that situation."

PST 45: "I don't honestly remember if I remembered anything about the first case when I wrote strategies. I probably did have some sort of memory trigger to help me write them but I'm not sure."

PST 92: "I remember that Susan was smart except for in geometry. I attributed this to her being better at thinking abstractly rather than tangibly."

PST 95: "I remember the geometry case, but I don't recall the case prior to it."

PST 97: "From what I remember, the earlier case helped me respond to the case because I think I could remember small details that connected with the second case. It was basically the same ideas in both cases. The strategies were pulled from the first case and were also helpful when filling out the case about Ms. Thomas and Susan."

PST 110: [No explanation provided]

Did Not Return for Post Experiment Interview Session (N = 6)

PST 37: [Not Available]

PST 42: [Not Available]

PST 90: [Not Available]

PST 96: [Not Available]

PST 98: [Not Available]

PST 108: [Not Available]

APPENDIX K

EXPERIMENT 2: SIMILAR CONTEXT, INTRINSIC SOLUTIONS ANALOG CASE (Word Count = 448) (Flesch Reading Ease = 67.7) (Flesch-Kincaid Grade Level = 8.0)

Please read and study the following case. If you finish before time is called, please continue to study the case.

Nancy Lyons is a 9th grade student at Riverside High School, which is part of a large suburban school district. The enrollment at Riverside High is 1,616 students, with 427 students in the 9th grade. Riverside High's mascot is the Eagle and sports play an important role in student life there.

Nancy enjoys many sports and is a member of both the school's swimming team and soccer team. Her two younger brothers love to watch her play. Nancy also likes to write poetry, cook, and go shopping with her friends in her spare time.

This year, Nancy is taking algebra. Unfortunately, she isn't very motivated to do well in algebra. She often seems inattentive in class, doesn't turn in most of her homework, sometimes skips class, and, not surprisingly, does poorly on tests. Her algebra teacher, Ms. Jennings, is pretty sure that Nancy could do a lot better in algebra if only she would try harder, so she asked Nancy to stay after school one day to have a one-on-one meeting.

Ms. Jennings began, "Nancy, I'd like to talk with you about how you are doing in my algebra class. Your grades seem to be getting worse and I'm really concerned about it. I want to help you because I know you can do better."

Nancy replied, "I just think algebra is hard to learn. I mean, subjects like history are pretty easy for me, but algebra isn't.

Ms. Jennings asked, "Can you tell me why you think it's so hard? What in particular makes algebra harder for you?"

Nancy thought for a few moments and then said, "Well, I guess what's hard for me is the time it takes to learn algebra. It takes a lot more time for me to do my algebra homework than it does to like, write an essay or read a chapter in history."

Ms. Jennings replied, "Thanks, Nancy. What you've said is really helpful. Let me think about things for a few days and see if I can come up with some strategies to help you out."

After spending a few days thinking about what Nancy had said, Ms. Jennings decided on several specific strategies to help Nancy become more motivated. She tried to make algebra more interesting to Nancy by including problems related to swimming and soccer in some of the homework problems. For a class project, she decided to have students research and present on ways algebra is used in real life settings. Students could choose whatever topic they wanted to research, so Nancy chose to find out how algebra can be used to revise cooking recipes when changing the quantities of ingredients needed for different numbers of people.

APPENDIX L

EXPERIMENT 2: SIMILAR CONTEXT, EXTRINSIC SOLUTIONS ANALOG CASE (Word Count = 456) (Flesch Reading Ease = 70.8) (Flesch-Kincaid Grade Level = 7.7)

Please read and study the following case. If you finish before time is called, please continue to study the case.

Nancy Lyons is a 9th grade student at Riverside High School, which is part of a large suburban school district. The enrollment at Riverside High is 1,616 students, with 427 students in the 9th grade. Riverside High's mascot is the Eagle and sports play an important role in student life there.

Nancy enjoys many sports and is a member of both the school's swimming team and soccer team. Her two younger brothers love to watch her play. Nancy also likes to write poetry, cook, and go shopping with her friends in her spare time.

This year, Nancy is taking algebra. Unfortunately, she isn't very motivated to do well in algebra. She often seems inattentive in class, doesn't turn in most of her homework, sometimes skips class, and, not surprisingly, does poorly on tests. Her algebra teacher, Ms. Jennings, is pretty sure that Nancy could do a lot better in algebra if only she would try harder, so she asked Nancy to stay after school one day to have a one-on-one meeting.

Ms. Jennings began, "Nancy, I'd like to talk with you about how you are doing in my algebra class. Your grades seem to be getting worse and I'm really concerned about it. I want to help you because I know you can do better."

Nancy replied, "I just think algebra is hard to learn. I mean, subjects like history are pretty easy for me, but algebra isn't.

Ms. Jennings asked, "Can you tell me why you think it's so hard? What in particular makes algebra harder for you?"

Nancy thought for a few moments and then said, "Well, I guess what's hard for me is the time it takes to learn algebra. It takes a lot more time for me to do my algebra homework than it does to like, write an essay or read a chapter in history."

Ms. Jennings replied, "Thanks, Nancy. What you've said is really helpful. Let me think about things for a few days and see if I can come up with some strategies to help you out."

After spending a few days thinking about what Nancy had said, Ms. Jennings decided on several specific strategies to help Nancy become more motivated. Ms. Jennings also offered Nancy some tangible rewards for working harder. For example, she made a rule that any student who got a grade of a "B" or better on the next two unit exams would get one of the cool math T-shirts given to the school by the textbook company. After talking with Ms. Jennings, Nancy's parents told her they would take Nancy and some friends to a professional soccer game if she could pull her grade up to a B on the next two unit exams.

APPENDIX M

EXPERIMENT 2: DISSIMILAR CONTEXT, INTRINSIC SOLUTIONS ANALOG CASE (Word Count = 539) (Flesch Reading Ease = 68.6) (Flesch-Kincaid Grade Level = 8.2)

Please read and study the following case. If you finish before time is called, please continue to study the case.

Jean Manning is in the 8th grade at Washington Middle School, which is in a school system located about 20 miles north of a large urban area. Washington Middle has been in operation for 10 years and offers a comprehensive curriculum to about 1,350 students in grades 6-8. There are about 357 students in Jean's class. Washington High is known in the area for their winning basketball team, but also for their marching band and other excellent music programs.

Jean has joined several school organizations, including the school newspaper and chorus. She also plays the flute and hopes to try out for the marching band in the spring. Her family always enjoys going to hear Jean sing or play. When not involved in school activities, Jean likes to jog and hang out with her friends. She also volunteers to build and repair houses with the local chapter of Habitat for Humanity in her city.

Jean is currently taking physical science, but she isn't doing very well in it so far. She often seems like she isn't paying attention in class, doesn't complete her lab reports, sometimes skips class, and has done poorly on the three tests given so far. Her science teacher, Ms. Coker, is pretty sure Jean could do better, so she decided to have a talk with her to see what was going on. To start off the discussion, Ms. Coker said, "Jean, let's talk about your work in my physical science class. I'm getting worried because your test scores are low. I know you can do better. What can I do to help?

Jean responded, "I know I'm not doing as well as I should. Science is really tough, at least for me. Other stuff, like social studies, just seems to come easier."

Ms. Coker then asked, "So why do you think science is so tough? What is it about science that makes it so difficult for you?

Jean paused for a moment and then answered, "It just seems like it takes so long to do my work in science. I mean, writing up a whole lab and trying to remember all that technical stuff just takes a lot longer than doing some math problems or reading a chapter in history. Science just takes a lot more time to learn, for me."

Ms. Coker told Jean she appreciated her honesty, and would think about ways to help her over the next few days.

After spending a few days thinking about what Jean had said, Ms. Coker decided on a couple specific strategies to help Jean become more motivated in science. She tried to make the class work more interesting for Jean by developing a lab for the unit on matter that looked at the chemical component of different newspaper inks and a lab for the unit on sound that looked at how different musical instruments produce sound waves. For a class project, she also decided to have students investigate and present on how some issue related to physical science affects real life. Students could choose whatever topic they wanted to research, and Jean chose to look at electricity because she was interested in how the electrical wiring worked in the houses she helped build and repair.

APPENDIX N

EXPERIMENT 2: DISSIMILAR CONTEXT, EXTRINSIC SOLUTIONS ANALOG CASE (Word Count = 518) (Flesch Reading Ease = 72.9) (Flesch-Kincaid Grade Level = 7.5)

Please read and study the following case. If you finish before time is called, please continue to study the case.

Jean Manning is in the 8th grade at Washington Middle School, which is in a school system located about 20 miles north of a large urban area. Washington Middle has been in operation for 10 years and offers a comprehensive curriculum to about 1,350 students in grades 6-8. There are about 357 students in Jean's class. Washington High is known in the area for their winning basketball team, but also for their marching band and other excellent music programs.

Jean has joined several school organizations, including the school newspaper and chorus. She also plays the flute and hopes to try out for the marching band in the spring. Her family always enjoys going to hear Jean sing or play. When not involved in school activities, Jean likes to jog and hang out with her friends. She also volunteers to build and repair houses with the local chapter of Habitat for Humanity in her city.

Jean is currently taking physical science, but she isn't doing very well in it so far. She often seems like she isn't paying attention in class, doesn't complete her lab reports, sometimes skips class, and has done poorly on the three tests given so far. Her science teacher, Ms. Coker, is pretty sure Jean could do better, so she decided to have a talk with her to see what was going on. To start off the discussion, Ms. Coker said, "Jean, let's talk about your work in my physical science class. I'm getting worried because your test scores are low. I know you can do better. What can I do to help?

Jean responded, "I know I'm not doing as well as I should. Science is really tough, at least for me. Other stuff, like social studies, just seems to come easier."

Ms. Coker then asked, "So why do you think science is so tough? What is it about science that makes it so difficult for you?

Jean paused for a moment and then answered, "It just seems like it takes so long to do my work in science. I mean, writing up a whole lab and trying to remember all that technical stuff just takes a lot longer than doing some math problems or reading a chapter in history. Science just takes a lot more time to learn, for me."

Ms. Coker told Jean she appreciated her honesty, and would think about ways to help her over the next few days.

After spending a few days thinking about what Jean had said, Ms. Coker decided on a couple specific strategies to help Jean become more motivated in science. She decided to offer Jean some tangible rewards for working harder. For example, she made a rule that any student who got a grade of "B" or better on the next two unit exams would get one of the cool science T-shirts given to the school by the textbook company. And, after talking with Ms. Coker, Jean's parents told her they would buy her some new Adidas running shoes if she could pull her grade up to a B on the next two unit exams.

APPENDIX O-1

EXPERIMENT 2: SIMILAR CONTEXT, INTRINSIC SOLUTIONS ANALOG CASE CLOZE TEST

Please read and study the following case. If you finish before time is called, please continue to study the case.

Nancy ______ is a _____ grade student at ______ High School, which is part of a large suburban school district. The enrollment at ______ High is 1,616 students, with ______ students in the ______ grade. Riverside High's mascot is the ______ and _____ play an important role in student life there.

Nancy enjoys many sports and is a member of both the school's ______ team and ______ team. Her two younger ______ love to watch her play. Nancy also likes to write poetry, ______, and go shopping with her friends in her spare time.

This year, Nancy is taking algebra. Unfortunately, she isn't very motivated to do well in algebra. She often seems ______ in class, doesn't turn in most of her ______, sometimes ______ class, and, not surprisingly, does poorly on tests. Her algebra teacher, Ms. Jennings, is pretty sure that Nancy could do a lot better in algebra if only she would try harder, so she asked Nancy to stay after school one day to have a one-on-one meeting.

Ms. Jennings began, "Nancy, I'd like to talk with you about how you are doing in my algebra class. Your grades seem to be getting worse and I'm really concerned about it. I want to help you because I know you can do better."

Nancy replied, "I just think algebra is hard to learn. I mean, subjects like _________ are pretty easy for me, but algebra isn't.

Ms. Jennings asked, "Can you tell me why you think it's so hard? What in particular makes algebra harder for you?"

Nancy thought for a few moments and then said, "Well, I guess what's hard for me is the

______ it takes to learn algebra. It takes a lot more time for me to do my algebra

homework than it does to like, write an _____ or read a _____ in history."

Ms. Jennings replied, "Thanks, Nancy. What you've said is really helpful. Let me think about things for a few days and see if I can come up with some strategies to help you out."

After spending a few days thinking about what Nancy had said, Ms. Jennings decided on several specific _______ to help Nancy become more motivated. She tried to make algebra more _______ to Nancy by including problems related to _______ and ______ in some of the homework problems. For a class project, she decided to have students research and present on ways algebra is used in real life settings. Students could choose whatever _______ they wanted to research, so Nancy chose to find out how algebra can be used to revise _______ when changing the quantities of _______ needed for different numbers of people.

APPENDIX O-2

EXPERIMENT 2: SIMILAR CONTEXT, EXTRINSIC SOLUTIONS ANALOG CASE CLOZE TEST

Please read and study the following case. If you finish before time is called, please continue to study the case.

Nancy ______ is a 9th grade student at ______ High School, which is part of a large suburban school district. The enrollment at ______ High is 1,616 students, with ______ students in the 9th grade. Riverside High's mascot is the ______ and ______ play an important role in student life there.

Nancy enjoys many sports and is a member of both the school's ______ team and ______ team. Her two younger ______ love to watch her play. Nancy also likes to write poetry, ______, and go shopping with her friends in her spare time.

This year, Nancy is taking algebra. Unfortunately, she isn't very ______ to do well in algebra. She often seems ______ in class, doesn't turn in most of her ______, sometimes ______ class, and, not surprisingly, does poorly on tests. Her algebra teacher, Ms. Jennings, is pretty sure that Nancy could do a lot better in algebra if only she would try harder, so she asked Nancy to stay after school one day to have a one-on-one meeting.

Ms. Jennings began, "Nancy, I'd like to talk with you about how you are doing in my algebra class. Your grades seem to be getting worse and I'm really concerned about it. I want to help you because I know you can do better."

Nancy replied, "I just think algebra is hard to learn. I mean, subjects like _________ are pretty easy for me, but algebra isn't.

Ms. Jennings asked, "Can you tell me why you think it's so hard? What in particular makes algebra harder for you?"

Nancy thought for a few moments and then said, "Well, I guess what's hard for me is the

______ it takes to learn algebra. It takes a lot more time for me to do my algebra

homework than it does to like, write an _____ or read a _____ in history."

Ms. Jennings replied, "Thanks, Nancy. What you've said is really helpful. Let me think about things for a few days and see if I can come up with some strategies to help you out."

Ms. Jennings offered Nancy some ______ rewards for working harder. For example, she made a rule that any student who got a grade of a ______ or better on the next ______ unit exams would get one of the cool ______ T-shirts given to the school by the ______ company. After talking with Ms. Jennings, Nancy's parents told her they would take Nancy and some friends to a professional ______ game if she could pull her grade up to a ______ on the next ______ unit exams.

APPENDIX O-3

EXPERIMENT 2: DISSIMILLAR CONTEXT, INTRINSIC SOLUTIONS ANALOG CASE CLOZE TEST

Please read and study the following case. If you finish before time is called, please continue to study the case.

Jean Manning is in the ______ grade at ______ Middle School, which is in a school system located about ______ miles north of a large urban area. ______ Middle has been in operation for ______ years and offers a comprehensive curriculum to about 1,350 students in grades 6-8. There are about 357 students in Jean's class. Washington High is known in the area for their winning ______ team, but also for their ______ and other excellent music programs.

Jean has joined several school organizations, including the school newspaper and ______. She also plays the ______ and hopes to try out for the marching band in the spring. Her family always enjoys going to hear Jean sing or play. When not involved in school activities, Jean likes to ______ and hang out with her friends. She also volunteers to build and repair houses with the local chapter of Habitat for Humanity in her city.

Jean is currently taking physical science, but she isn't doing very well in it so far. She often seems like she isn't paying attention in class, doesn't complete her ______, sometimes skips class, and has done poorly on the ______ tests given so far. Her science teacher, Ms. Coker, is pretty sure Jean could do better, so she decided to have a talk with her to see what was going on.

To start off the discussion, Ms. Coker said, "Jean, let's talk about your ______ in my physical science class. I'm getting worried because your test scores are low. I know you can do better. What can I do to help?

Jean responded, "I know I'm not doing as well as I should. Science is really tough, at least for me. Other stuff, like ______, just seems to come easier."

Ms. Coker then asked, "So why do you think science is so tough? What is it about science that makes it so difficult for you?

Jean paused for a moment and then answered, "It just seems like it takes so long to do my work in science. I mean, writing up a whole ______ and trying to remember all that ______ stuff just takes a lot longer than doing some ______ problems or reading a chapter in ______. Science just takes a lot more time to learn, for me."

Ms. Coker told Jean she appreciated her honesty, and would think about ways to help her over the next few days.

After spending a few days thinking about what Jean had said, Ms. Coker decided on a couple specific _______ to help Jean become more motivated in science. She tried to make the class work more interesting for Jean by developing a _______ for the unit on matter that looked at the chemical component of different _______ and a lab for the unit on sound that looked at how different musical instruments produce _______. For a class project, she also decided to have students investigate and present on how some issue related to physical science affects real life. Students could choose whatever topic they wanted to research, and Jean chose to look at _______ because she was interested in how the _______ wiring worked in the houses she helped _______ and ______.

APPENDIX O-4

EXPERIMENT 2: DISSIMILAR CONTEXT, EXTRINSIC SOLUTIONS ANALOG CASE CLOZE TEST

Please read and study the following case. If you finish before time is called, please continue to study the case.

Jean Manning is in the ______ grade at ______ Middle School, which is in a school system located about ______ miles north of a large urban area. ______ Middle has been in operation for ______ years and offers a comprehensive curriculum to about 1,350 students in grades 6-8. There are about 357 students in Jean's class. Washington High is known in the area for their winning ______ team, but also for their ______ and other excellent music programs.

Jean has joined several school organizations, including the school newspaper and ______. She also plays the ______ and hopes to try out for the marching band in the spring. Her family always enjoys going to hear Jean sing or play. When not involved in school activities, Jean likes to ______ and hang out with her friends. She also volunteers to build and repair houses with the local chapter of Habitat for Humanity in her city.

Jean is currently taking physical science, but she isn't doing very well in it so far. She often seems like she isn't paying attention in class, doesn't complete her ______, sometimes skips class, and has done poorly on the ______ tests given so far. Her science teacher, Ms. Coker, is pretty sure Jean could do better, so she decided to have a talk with her to see what was going on.

To start off the discussion, Ms. Coker said, "Jean, let's talk about your work in my physical science class. I'm getting _____ because your test scores are low. I know you can do better. What can I do to help?

Jean responded, "I know I'm not doing as well as I should. Science is really tough, at least for me. Other stuff, like ______, just seems to come easier."

Ms. Coker then asked, "So why do you think science is so tough? What is it about science that makes it so difficult for you?

Jean paused for a moment and then answered, "It just seems like it takes so long to do my work in science. I mean, writing up a whole ______ and trying to remember all that ______ stuff just takes a lot longer than doing some ______ problems or reading a chapter in ______. Science just takes a lot more time to learn, for me."

Ms. Coker told Jean she appreciated her honesty, and would think about ways to help her over the next few days.

After spending a few days thinking about what Jean had said, Ms. Coker decided on a couple specific ________ to help Jean become more motivated in science. She decided to offer Jean some _______ rewards for working harder. For example, she made a rule that any student who got a grade of _______ or better on the next _______ unit exams would get one of the cool _______ T-shirts given to the school by the textbook company. And, after talking with Ms. Coker, Jean's parents told her they would buy her some new _______ unit exams ________.

exams.

APPENDIX P

MSLQ	М	SD	Ν
Intrinsic Goal Orientation	5.17	.98	43
Extrinsic Goal Orientation	5.85	.90	43
Task Value	5.82	.80	43
Control of Learning Beliefs	5.66	.76	43
Self-Efficacy for Learning and Performance	5.77	.71	43
Test Anxiety	3.83	1.48	43

MEANS AND STANDARD DEVIATIONS FOR MSLQ

Published Data from MSLQ

MSLQ	М	SD	Ν
Intrinsic Goal Orientation	5.03	1.09	380
Extrinsic Goal Orientation	5.03	1.23	380
Task Value	5.54	1.25	380
Control of Learning Beliefs	5.74	.98	380
Self-efficacy for Learning and Performance	5.74	1.14	380
Test Anxiety	3.63	1.45	380