The French Connections: Examining the Links among
Epistemological Beliefs, Goal Orientations and Self-Efficacy

Laurence Filisetti, University of Grenoble, France
Helenrose Fives, University of Maryland, U.S.A.

The French Connections: Examining the Links among Epistemological Beliefs, Goal Orientations and Self-Efficacy

Understanding the influences on students’ performance is one of the primary concerns of educational research. In our endeavors to understand the ways students learn, their motivation for learning, and the factors which can affect learning, we must recognize the multiplicitious nature of any learning environment. In any individual learner’s experience, there are many forces which can affect learning. However, the educational-culture of learning environments is often overlooked in our quest for understanding the learning process. Moreover, as discussed by Alexander (2001), there appears to be an over-reliance on American populations to define the psychometric and theoretical parameters of central educational psychological constructs. Even when cross-cultural investigations are conducted, she argued, it is often the American populations that become the base against which other cultures are contrasted. For that reason, Alexander called for the internationalization of educational studies where constructs are studied and described within their rich, varied cultures without privileging the American perspective and outcomes. At a minimum, the internationalization of educational research would require meaningful ties between educational constructs and the educational contexts in which they take shape rather than an abstraction from that sociocultural context.

Therefore, the present investigation seeks to understanding the structure and relationships among the constructs of students’ epistemological beliefs, goal orientations, and self-efficacy within the French cultural and educational environment. We rely on Bandura’s (1989) theory of Triadic Reciprocal Determinism as a guide in our theoretical and empirical investigation into the nature of these beliefs constructs. Triadic Reciprocal Determinism reflects the important interrelationships among learners’ cognition, their behaviors, and environment. According to
Bandura (1989) each of these components has a direct effect in shaping the other two and guiding their responses (1989). The current investigation seeks to explore the interrelationships among cognition, behavior, and environment in French university students. Specifically, we will explore the cognitive belief constructs of epistemology, goal orientations, and self-efficacy. Student performance on two cognitive tasks, one assessing crystalized (mathematical) ability and one assessing fluid ability (involving spatial reasoning), will also be assessed in relation to the belief constructs of interest. Finally, this study is situated within the French university system, thus, the educational culture of French schools will be explored as the overall environment.

We offer this investigation as an important initial step in understanding the nature of these belief constructs and the ways in which they may be impacted by the educational culture in which they are situated. Further, this research enables us to shed our preconceived expectations regarding epistemological and motivational beliefs, which have been shaped, in our case, by the American dominated literature. This shedding has offered us the opportunity to explore these constructs anew and to challenge our own understanding of their meaning.

The remainder of the paper serves to provide a theoretical background of epistemological beliefs, goal orientations, and self-efficacy. Each of these belief constructs will be defined and explained as is reflected in the current literature. When possible any studies situated in France will be explicitly discussed. In addition, an in-depth discussion of the structure of the French educational environment will be provided. The goal of this section is to illuminate the reader as to the nature and structure of education in France and provide a backdrop for the analysis of the current investigation. This section relies heavily on research conducted as comparison studies between France and other cultures, as well as ethnographic studies which serve to make visible
the educational culture in the schools examined. Following these sections, the current study will be presented.

Theoretical Overview

Recent research has begun to focus on the important intersection among students epistemological beliefs and achievement motivation constructs (Buehl & Alexander, 2000; Murphy, Buehl, Monoi, & Long, 2002). For example, Buehl and Alexander (2000) found students’ epistemological beliefs to be significantly related to their goal orientations (i.e., mastery, ego, and work avoidance) and self-efficacy for ill- and well-structured tasks. Murphy and colleagues (2002) identified significant relationships epistemologies and goal orientations (i.e. learning, performance approach, performance avoidance, and work avoidance) in urban middle-school students’ (i.e., eighth and ninth grade students). However, little investigation of these constructs in conjunction with one another has occurred outside of the United States.

Many studies have brought forth the link between the students’ epistemological beliefs and their academic performance (e.g., Hofer, 2000; Ryan, 1984; Schommer, 1993). In addition, students’ goal orientations (e.g., Midgley, Kaplan, Middleton, 2001) and self-efficacy beliefs (e.g., Bandura 1997) have also been connected to students’ academic outcomes. The present study investigates these constructs as they are situated for students studying within the French educational system.

Epistemological Beliefs

General Review of Epistemological Beliefs Literature

Epistemological beliefs are individuals’ beliefs about nature and structure of knowledge (Buehl, Alexander & Murphy, 2002; Hofer & Pintrich, 1997). Epistemological beliefs have been studies throughout the philosophical literature; however, psychological research on
epistemological beliefs did not begin until the mid 1950’s (Hofer & Pintrich, 1997). In Hofer and Pintrich’s (1997) extensive review of the epistemological literature they identified three key and intersecting waves of exploration that may be used to characterized the psychological research on epistemology.

The first wave of research identified by Hofer and Pintrich (1997) investigated the development of epistemological beliefs over time (e.g., Perry, 1970). The second wave of research focused on the ways that epistemological beliefs affect thinking and reasoning (e.g., King and Kitchner, 1994). The third and most recent wave of research on these beliefs has explored the structure of epistemology as a system of belief constructs, comprised of multiple dimensions rather than as a general construct (e.g., Schommer, 1990). In connection with this exploration of multidimensionality, there has also been interest in the extent to which epistemology beliefs are domain specific (e.g., Hofer, 2000; Buehl et al., 2002).

The present research is grounded in the more recent trends of the third wave of research in the epistemological belief literature. That is to say, we recognize the importance of both multidimensional and domain specific views of epistemological beliefs. Thus, we will provide a brief outline of the theoretical meaning of multidimensionality and domain specificity in the epistemological belief literature.

Five dimensions of epistemological beliefs have been explored in the research (e.g., Schommer, 1990). These dimensions included beliefs about the structure, stability, and source of knowledge, as well as, the nature of knowledge acquisition and the ability to acquire knowledge. Beliefs about the structure of knowledge involve the understanding of knowledge in terms of how integrated knowledge is viewed by individuals. On a continuum, is knowledge considered to be isolated and simple or integrated and complex? For example, is our concept of
regression an isolated nugget of knowledge or is it embedded in an interconnected framework of statistical, mathematical, and perhaps scientific knowledge?

The second dimension of epistemological beliefs, the stability of knowledge, is used to explore the degree to which individuals see knowledge as certain. This dimension reflects the extent to which knowledge is considered fixed, unchanging, or uncertain and changeable with time. The source of knowledge is the third dimension of epistemological beliefs. This dimension responds to the question of where knowledge originates. Is knowledge passed down from an authority or is it individually constructed and supported via experience and reason?

There continues to be debate in the literature as to the epistemological status of the final two dimensions of epistemological beliefs, the nature of knowledge acquisition and the ability to acquire knowledge. The former taps into beliefs about the ease or effort and speed of knowledge acquisition. The latter taps reflects the extent to which individuals believe that the ability to acquire knowledge is fixed or incremental. Criticism regarding the classification of these beliefs as epistemological has focused on the extent to which these dimensions more readily describe intelligence or ability beliefs rather than beliefs about the nature of knowledge itself (Hofer & Pintrich, 1997).

In addition to the multidimensional nature of epistemological beliefs, researchers have explored the extent to which beliefs about knowledge are domain specific (see Buehl et al. 2002). This perspective embraces the multidimensional nature of knowledge beliefs described previously, but adds another level of differentiation with regard to knowledge domains. That is, rather than conceptualizing knowledge in all domains as the same with regard to structure, stability, source, the nature of acquisition, and the ability to acquire knowledge, a domain specific perspective allows for differences in these dimensions across domains. Moreover, these
differences in dimensions of knowledge beliefs across domains may be related to the inherent structure of the domain under examination. For example, one's belief about the degree of integration of mathematics, a well structured domain, may be distinct from the same dimension of belief in history, a more ill-structured domain.

Buehl and colleagues (2002) have identified unique belief factors for students in the domains of mathematics and history. These domains of study were chosen due to their nature and structure. Mathematics is considered to be a well-structured domain, encompassing many grounding rules, algorithms, and methods for navigating the content. In contrast, history is conceptualized as a more ill-structured domain. History relies heavily on the scholar’s ability to locate, analyze, and interpret evidence related to historical events or interest. Further, two equally qualified and experienced historians may look at the same evidence and reach different conclusions as to its meaning.

In the work of Buehl and her colleagues (2002), four factors were identified reflecting students’ domain-specific epistemological beliefs. These factors included the integration of knowledge for history, and for mathematics, as well as, the effort to acquire knowledge for both history and mathematics. While questions arise as to the extent that effort of learning is an epistemological belief, this work provides evidence of the domain-specific nature of epistemological beliefs.

In the present study, we accept both a multidimensional and domain-specific perspective on epistemological beliefs. However, we also recognize that these understandings of knowledge beliefs are rooted in the American educational culture and we presently seek to explore how these beliefs manifest in French university students.
Research on Epistemological Beliefs in France

In preparing this review, the present investigators were not able to locate any studies conducted in France which explored students’ epistemological beliefs. The closest connection we found was an investigation of students’ beliefs about intelligence as fixed or incremental, beliefs about effort and ability and the connection of these beliefs to goal orientations (Dupeyrat & Escribe, 2000). As described in the previous sections on epistemological beliefs, some researchers consider beliefs about knowledge acquisition and beliefs about the ability to acquire knowledge as components of epistemological beliefs. Thus, the investigation by Dupeyrat and Escribe (2000) may have tapped into these ideas through the terms intelligence and ability. These researchers assessed students’ beliefs about intelligence as fixed or incremental which maps on to the epistemological construct of the ability to acquire knowledge. Additionally, Dupeyat and Escribe (2000) assessed students’ beliefs about effort to improve abilities which seems to reflect the epistemological construct of knowledge acquisition.

Dupeyat and Escribe (2000) asked three-hundred and one third year French psychology students to respond to a questionnaire, constituted of four scales. Goal orientations were measured with a French version of Hayamizu and Weiner’s (1991) scale. The students’ intelligence conceptions were assessed by Hong, Chiu and Dweck’s scale (1995). Finally, the beliefs about effort and abilities were assessed by Dweck’s scale (1997).

The data collected in this investigation confirmed Hayamizu and Weiner (1991) findings of a three factor solution for goals: mastery, a social approval performance goal and a normative performance goal (perform to obtain an exam grade). The relations between these goal orientations and students’ intelligence conceptions revealed that the students who had a mastery orientation did not hold a fixed conception of intelligence. There was no relation between the
two performance goals and fixed intelligence conception found. Finally, the results between goals and beliefs about effort and abilities revealed that students who held mastery goals and those who held normative performance goals believed that the development of their abilities is directly related to the effort. In contrast, students who held social approval performance goals believed that effort did not contribute to developing abilities. This study brings to the forefront that relations among goals, beliefs, and conceptions of intelligence may be different across cultures.

Goal Orientations

General Review of Goal Orientations

At the most general level, one can divide the concept of goals into two categories: the content of goals and goal orientations (Murphy and Alexander, 2000). Researchers interested in the content of goals conceptualize goals as a “performance standard or objective toward which individuals are aiming their attention and caring” (Murphy and Alexander, 2000 p. 35). Pintrich and Schunk (1996) define goal content as “the desired or undesired consequences of a particular goal” the assessment of which is achieved by asking individuals what they want (p. 220). Therefore, the conception of goal content is concerned with the specific objectives and activities in which individuals want to achieve, for example the goal of getting ten math problems correct. In contrast, goal orientation theorists see goals as a “reason or purpose for engaging in some learning oriented activity” (Murphy and Alexander, 2000, p. 35). The focus of goal orientation theory is on determining the reasons why an individual wants to accomplish given tasks and how tasks are approached (Pintrich and Schunk, 1996).

We contend that both of these aspects of goals are at work on all individuals. That is, individuals have specific goals they want to achieve, for example, earning a high score on their
final exam. These specific goals represent goal content, the actual aims and objectives that individuals set forth to accomplish. In addition, to these specific goals individuals approach their task with a given goal orientation, which when studied can shed light on the selection of goals and the manner in which they are achieved. The present investigation, focuses on goal orientations and the structure of these belief patterns in French University students.

Goal orientations or patterns have developed from two central belief orientations: mastery goals associated with learning, task, and effort, and performance goals associated with external benefits and ability beliefs. (Midgley et al., 1998). Throughout the research literature on goal orientations, a variety of terms have been used to describe these orientations. A thorough review of the literature reveals that these differences in terminology often reflect variations among different research traditions. For the purpose of the present work, we will not discuss the elaborate development of goal terminology and will instead focus on the current understanding of goal orientations observed in the field and utilized in the present study.

Specifically, branching out from the two goal themes of mastery and performance, researchers have further delineated the types of goal orientations individuals may possess, to include: mastery, performance-approach, performance-avoidance, and work avoidance goal orientations. Each of these orientations will be described and the potential effects of holding particular orientations will be addressed.

A mastery goal orientation is associated with a focus on learning. This orientation is characterized by an ambition to master tasks or content based on self standards, a willingness to attempt challenging tasks, and a desire for self improvement and increased competence (see Ames, 1992; Dweck & Legget, 1988; Maher & Midgley, 1991; Nicholls, 1984, Murphy & Alexander, 2000; Pintrich & Shunk, 1996). Researchers have found that when mastery goals are
emphasized students tend to focus on improvement, task mastery, and learning as measures of success, they tend to value effort and are willing to attempt challenging tasks (Ames, 1992; Maehr & Midgley, 1991; Pintrich & Shunk, 1996).

Performance goals, however, highlight a focus on the demonstration and judgment of ability (Pintrich and Shunk, 1986). Further, Dweck (1990) described performance goals as individuals’ desire to gain positive assessments of competence and to avoid negative assessments. The research of Middleton and Midgley (1997) explored this understanding of performance goals in terms of approach and avoidance. Individuals with a performance-approach orientation are those who seek to look good and receive favorable judgments from revered others (e.g., teachers, peers). In contrast, individuals exhibiting a performance-avoid orientation, seek to avoid looking bad or performing poorly in front of others. Thus, some individuals are out to show how great they are (performance-approach) and others are out to prevent the embarrassment of demonstrating a lack of achievement (performance-avoid).

When performance goals are emphasized students measure their success in terms of high grades, social comparisons and winning at all costs (Pintrich & Shunk, 1996). These students, who have, perhaps, internalized these performance goals, also work to avoid failure and, as such, engage in less challenging activities wherein they can be assured of successful performance outcomes (Pintrich & Shunk, 1996).

Nicholls and colleagues (1990) offer a fourth goal orientation, work-avoidant goals, to the goal theory literature. These goals are demonstrated by a desire for academic tasks to be easy and require little effort (Nicholls, 1989). While some researchers have explored the work-avoidant goal orientations (e.g., Meece & Holt, 1993; Meece, Blumenfeld, & Hoyle, 1988) this orientation
has not be subject to the same amount of scrutiny and acceptance as mastery and performance orientations.

Urdan (1997) suggests the reason for this lack of acceptance is due to the conceptual meaning of work-avoidant goals as it fits within an achievement goal framework. Achievement goals can be understood as a means for understanding or providing justification for students’ academic achievement or lack of achievement. Urdan (1997) contends that the work-avoidant orientation does not address this key meaning of achievement goals. The present study, however, investigates French university students goal orientation structure in terms of mastery, performance-approach, performance-avoid, and work-avoidant goals. We feel that work avoidant goals do serve to explain to some extent students’ success or failure in academic tasks. While these goal types may not explicitly explain achievement or the lack there of, they do provide information about students motivations and approach to achievement tasks that can add to the richness of our understanding of the learning process.

For many years, the conception that students appear to have an overall better, richer, more valuable learning experiences when mastery goals are emphasized by the school and internalized by the student was emphasized in the literature (e.g., Anderman & Maehr, 1994; Ames, 1992; Maehr & Midgley, 1991). Mastery goals were found to be related to may desirable outcomes within learning environments (e.g., Ames, 1992, Pintrich & Schunk, 1996). Alternatively, the research on performance goals was less clear, both adaptive and less adaptive outcomes were found in relation to these goals. Given the positive results found for students with mastery goal orientation these goals were endorsed and considered best (Pintrich, 2000).

However, the acceptance of this conceptualization has recently been challenge. Some researchers contend that the goal orientations held by individuals are less important than the
emotional and cognitive consequences of these goals (Pintrich, 2000). Further, researchers have found that the students may contain a variety of goal orientations and that these beliefs may work in conjunction with each other to lead to positive achievement outcomes. For example, Midgley, Kaplan, and Middleton (2001) found performance approach goals to be beneficial when combined with positive levels of mastery goals.

While the emphasis on one goal orientation or another continues to be debated in the literature, it seems to us that a key aspect of this discussion is being omitted, that aspect is context. Are particular goal orientations more or less adaptive in different contexts? Moreover, are learners’ goal orientations affected by the educational culture of their environment?

Research on Goal Orientations in France

Compared with American research, few French studies have been focused on the goal orientations of students. The aims of some of these studies were to adapt and validate scales used with American samples in the French language. To create these French versions of questionnaires, not only French psychologists ran studies but also French speaking experimenters, such as Quebecois (Bouffard, Vezeau, Romano, Chouinard, Bordeleau & Filion, 1998) and Belgians (Galand & Gregoire, 2000, Galland & Phillipot, 2002). For example, one of the first French versions of a motivational goal measure was adapted by Galand and Gregoire (2000) from Nicholls’ scale (1989). These authors chose to use this scale because it is largely used by American researches. Two hundred students enrolled in two Belgian elementary schools were asked to answer a set of questionnaires. They completed a measure related to their goals orientation: learning orientation (perform to master a task), performance orientation (perform to be better than others), and work-avoidance (avoiding effort and work). In addition, students completed measures related to their self-concept of school in general, in mathematics, in reading,
and in non-academic domains. As seen with Nicholls’ original scale and participant groups, the factor analysis reveals three motivational orientations: learning orientation, performance orientation, and work-avoidance. Additional results reveal that a learning goal orientation is positively related to all self-concept domains. Performance goal orientation is related to self-concept in mathematics and in school in general whereas a work-avoidance goal orientation is related to self-concept in non-academic domain.

Galand and Phillipot (2002) created their own French version of a motivational measure in which they integrated different types of orientations that exist in the goal literature. These authors tested several models to establish which motivational orientations would best be adapted for Belgian students. Indeed, they tested: 1) a model composed by four factors (learning orientation, performance-approach orientation, performance-avoidance orientation and work-avoidance orientation), 2) a model composed of three factors (learning orientation, performance orientation (approach and avoidance within a same factor) and work-avoidance orientation) 3) a model composed of a learning orientation, a performance-approach orientation and a performance-avoidance and 4) a model composed of a learning orientation and by a performance orientation. Three hundred and two students enrolled in Belgian middle and high schools were asked to answer to 16 items about their goal orientation: learning orientation, work-avoidance orientation, performance-approach orientation and performance-avoidance orientation. The factors analyses revealed that only three factors may be taken into account for Belgian students: performance orientation (approach and avoidance in a same factor), learning orientation, and work-avoidance orientation. While the studies reported here were not conducted with French participants, these Belgian studies are very relevant for French psychologists to improve their methodological instruments.
To our knowledge, only one study, Darnon and Butera’s (in preparation), investigated goal orientations within the French educational setting. Contrary to the Belgian authors (Galand & Gregoire, 2000; Galand & Phillipot, 2002), Darnon and Butera (in preparation) built on Elliot and McGregor’s scale (2001). The Elliot and McGregor (2001) instrument assesses a 2x2 achievement goal framework in which approach and avoidance are attributed to both performance and mastery orientations. Within this conceptualization mastery goals may be considered from an approach standpoint, in which individuals seek to attain understanding or competency as well as from an avoidance perspective, in which individuals seek to avoid misunderstanding or incompetence. Therefore in their study, Darnon and Butera (in preparation) investigate four types of goals orientation: mastery-avoidance, mastery-approach, performance-approach and performance-avoidance.

In addition to developing a French version of this scale, Darnon and Butera (in preparation) also studied the different cognitive strategies that each orientation may generate (e.g., deep-processing strategies, superficial strategies, and disorganization) and their impact on intrinsic motivation. The participants in this study were 159 second year French psychology students enrolled at the university. These participants were asked to answer to a set of questionnaires comprised of a goal orientation measure, a cognitive strategy questionnaire, and an intrinsic motivation questionnaire. The factor analysis of the goal orientation measure revealed, as expected, four factors, corresponding to the four motivational orientations. In addition, regression analyses revealed that mastery-approach orientation positively predicts the use of deep cognitive strategies whereas performance-avoidance orientation negatively predicts their use. Superficial strategies are predicted by performance-avoidance orientation as well as mastery-approach orientation. Disorganization strategies are positively predicted by a mastery-
avoidance orientation and negatively predicted by a mastery-approach one. Finally, intrinsic motivation is predicted positively by mastery-approach orientation whereas it is negatively predicted by performance-avoidance orientation.

These studies on measurement validation are relevant for several reasons. The Belgian research demonstrates that a model with four dimensions may not be appropriate for Belgian students enrolled in middle and high school, suggesting that differences may exist across cultural groups. Performance orientation, mastery-orientation and work avoidance would be the best model for these students. In contrast, Darnon and Butera stipulate that approach and avoidance dimensions in performance orientation (as well as in mastery orientation) exist for French students at the University of Grenoble. The present study will add much needed information about French students’ goals orientation.

Of the French studies that investigated goal orientations, many are related to sport. As in social psychology, sport psychologists have studied scale validation. For example, Durand, Cury, Sarrazin and Famose (1996) developed a French version of Roberts and Balague’s (1991) questionnaire which addressed mastery and performance orientations. This version of the instrument was used in Sarrazin, Roberts, Cury, Biddle, and Famose’s study (in press). More interestingly, the aim of this research was to study the impact of goal orientation (task, mastery or ego, performance), task difficulty, and perceived ability on performance and effort in a climbing task. Seventy-eight boys enrolled in French middle school participated. The results revealed that students who were task-involved put forth more effort and performed better than students who are ego-involved. Among the students who were task-oriented, those with high perceived ability demonstrated the most effort on difficult tasks whereas those with low perceived ability demonstrated the most effort on easy and moderate tasks. Finally, among
students who are ego-oriented, those who have high perceived ability provide most effort in
difficult task whereas those who have low perceived ability provide more effort in easy task.

Recently, Cury, Elliot, Sarrazin, Da Fonseca and Rufo (2002) studied the importance of
perceived ability. Indeed, they considered that students’ perception, as well as, the value that the
students attribute to the competence (is it important or not to attain competence), their task
absorption (concentration), and their level of anxiety may be mediators between goal orientation
and intrinsic motivation to achieve a basketball task. According to the trichotomous model of
Elliot and Harackiewicz (1996), three goals orientation were studied: performance-approach,
performance-avoidance and mastery orientation. Ninety students in a French middle school
participated in the experiment.

Goal orientations were manipulated by the researchers in the directions that the
experimenter provided. That is, three experimental conditions were created by providing the
participants different criterions for the assessment of competence. For example in the
performance approach condition, the experimenter explains that the students “…will be
compared with other French students to select the best student in basketball dribbling” (Elliot &
Harackiewicz, 1996, p. 9). The second condition established a performance avoidance
orientation by describing the goal of the assessment as selecting the worst dribblers to use as an
example and show other students what kind of errors they should avoid. The final condition, a
mastery orientation, was established by explaining that the purpose was to measure how the
instruction on dribbling was good and to use it after at school.

Intrinsic motivation was measured by recording the amount of time students spent
dribbling during two periods of time when they were free to dribble or read magazines or doing
nothing. In addition, students were asked to answer a set of questions that assessed their
competence valuation, their absorption during the task of dribbling, and their perceived ability. The results revealed that whatever the perceived ability, performance-avoidance undermines intrinsic motivation. Performance-approach orientation and mastery orientation have a similar impact on intrinsic motivation. Therefore, performance-approach may have positive effect on intrinsic motivation to achieve a physical task. These researchers suggest that three a performance-avoidance orientation may be mediated through, competence valuation, anxiety level, and absorption to negatively impact students’ intrinsic motivation.

These French studies provide an interesting backdrop for the current investigation. Indeed, whatever the domain (social psychology or sport psychology), it is brought to the fore that different methodologies to study goal orientation may be used. According to these results we see that as in other goal orientation literature different goals orientations exist among French students. Further, specific goal orientations may be related to intrinsic motivation, engagement in physical or academic tasks, and anxiety. These interesting results highlight the potential for research on goal orientations in France must be pursued. Too few studies exist. This present research is very relevant to improve this topic, methodologically as well as theoretically.

**Self-Efficacy**

Self-efficacy, as defined by Bandura (1986) refers to individuals’ “judgment of their capabilities to organize and execute courses of action required to attain designated types of performances” (p. 391). This self-perception according to Bandura determines our levels of motivation, specifically influencing the degree to which a task is pursued in relation to positive or negative perceptions of ability (Bandura, 1997). Thus, self-efficacy is the degree to which an individual believes he or she will be able to accomplish a specific task. In social cognitive theory, Bandura (1977) identifies two types of expectancies: outcome and efficacy. Outcome
expectations describe the belief that a particular behavior is capable of producing the desired outcome, providing that the behavior itself can be carried out (Bandura, 1977). Efficacy expectations refer to an individual's belief that he or she can accomplish the behavior needed to produce a given outcome (Bandura, 1977). Thus, the notion of self-efficacy is rooted in an individual’s perceived ability to accomplish a specific task with specific anticipated results. These beliefs are sensitive to the contextual factors of each situation (Pajares, 1996). In contrast, other expectancy beliefs describe a more general view of self-perceived ability, looking at general performance expectations, perceptions of competence and domain specific self-concepts (Pajares, 1996).

Research has shown self-efficacy beliefs to mediate skills or performance by influencing effort, persistence, and perseverance (Bandura and Schunk, 1981; Pajares, 1996). In addition, students of all ability levels when given training which enhanced both skills and self-efficacy out performed, in terms of number of problems and willingness to redo work, students of equivalent ability levels who received only additional skill training (Pajares, 1996). Thus, self-efficacy beliefs, not only indicate the degree to which an individual will persist at a task (selected or assigned) but can also be enhanced through intervention to increase their overall benefit to students.

Thus, self-efficacy has been demonstrated to be a solid base of information on which to help the development of knowledge in learners. Further, self-efficacy meets one of the goals of achievement motivation by explaining an individuals’ “persistence and vigor” in carrying out a task (Wigfield & Eccles, 1992 p. 265). However, the extent to which efficacy beliefs may or may not be related to achievement on performance tasks, goal orientations, and epistemological
beliefs of French university students has not been explored. Moreover, the reported self-efficacy beliefs of French students may be unique, given the educational culture of that country.

**French Educational Culture**

The French educational system is multileveled and reflective of the culture in which it is situated. Jean Boussinesq (1994) provided an exposition of the most important laws relative to French schools. The French educational system is constituted of two kinds of schools, public and private. Globally, public school is defined as any school created and managed by the State, towns, or departments. In contrast, private schools are created and managed by associations or private individuals.

**History and Purpose of Education in France**

Valls-Russell (2000) provides a brief history of the development of free public education in France. Napoleon I broke free of the Catholic Church’s hold on education by creating the first secular state schools, *lycees*, these schools charged tuition until 1845 (Valls-Russell, 2000). However, in 1882, the then Prime Minister, Jules Ferry, supported passing a law mandating free, secular, and compulsory education. Essentially, the purpose of free education was to release poor families from the hold of the Catholic Church and to bring France’s regions into a singular nation with a common language through the imposition of a national curriculum (Valls-Russell, 2000).

Today, the purpose of education in France seems to rest on its recognized social role of promoting equality (Planel, Broadfoot, Osborn, Sharpe, & Ward, 2000). As Osborn (2001) stated “education in France has been organized according to the republican idea, which sees the state as having a duty to ensure a universal system, providing equal opportunities for all” (p. 270). Thus, education in France rests on established ideas regarding equal opportunity and social integration (Broccolichi & van Zanten, 2000).
Basic Features of French Schools

Free and compulsory. Since June 1881, when the Jules Ferry’s law was passed, public schooling in France was made free and compulsory (Boussinesq, 1994). Children (i.e., girls and boys) ages six through fourteen were required to attend school. In 1959, this requirement was extended, increasing compulsory education to age sixteen. These additional two years of school were added to increase general knowledge and more importantly vocational and technical abilities (Clause # 2. Ruling of January, 6th 1959). The presence of children at school is strictly monitored and some sanctions may be administered if a child is deemed truant from school. Sanctions may include expulsion from school and or the ending of financial aid that the state gives to each family that has at least two children.

Non-religious. Teachers are not allowed to exhibit their religious beliefs (through verbal discourse or physical demonstration, such as holy medal) nor their political opinion (circular of December, 12th 1989 from Lionel Jospin). This law does not mean that different types of religion or religious or political dimensions of history or philosophy can not be taught. Rather content containing religious information must be instructed with neutrality to all ideas. Religious and political propaganda on the part of teachers is harshly punished.

The students are allowed to exhibit their religious belonging or their political opinion. Indeed, the Council of State in 1989 reminded the public that secularism engenders respect of all beliefs as the Declaration of Humans Rights stipulated in 1789. Therefore, any discrimination or violence related to religious or ethnic belongingness is harshly punished. Nevertheless, respecting students’ beliefs does not mean accepting the proselytism that they could do within the school.
Curriculum organization. The Jospin Law (Clause # 1, July, 14th 1989) stated that education must lead everyone to self and knowledge development. Further, education must help everyone become a contributor in social and professional life, to help all citizens exert their rights. The foundation of this view of education is rooted in the belief that education contributes to equality for all people. This underscores the focus of education in France to develop everyone, and illuminates one of the seemingly fundamental beliefs that is manifested in the educational opportunities of this country (Cam, 2001).

The curriculum for each grade is determined by the state and each teacher must lead children to develop specific knowledge specified for each grade. The teacher is free to use his or her own instructional methods and select the textbooks (from a list that the national department of education provides) the students will use (Derouet, 2000). The use of explicit national standards and objectives provide pupils, teachers, and parents with tangible learning expectations. However, attainment of these expectations is considered to be the responsibility of the student with the aide of the teacher.

Planel and colleagues (2000) articulated the values and approach of education in France based on their evaluation of French national assessments. These researchers described French education as emphasizing methods and systems in instruction and learning, placing a high value on knowledge, and recognizing learning as a process that occurs in stages and requires explicit instruction. Moreover, education in France is seen as rooted in the logic and rationality articulated by Descartes (Planel et al., 2000).

Lee (1994) described the French curriculum as placing a greater emphasis on mathematics and science than schools in Britain (Lee, 1994). Similarly, Planel and colleagues (2000) in their comparison of French and English national assessments determined that the
French approach to mathematics seemed to be more systematic than the English approach, and that the French focused on greater depth of study rather than covering a broad array of content. Further, within the French system greater prestige is associated with studying and achieving in math and science (Prost, 2000; Duru-Bellat, 2000). For example, studying for the scientific *baccalauréat* S is the path students must take if they desire to get into the most prestigious *grandes écoles*, (e.g., Polytechnique, Central) and into the major business or engineering schools (Galland & Oberti, 2000). Moreover, mathematics receives substantially more class time in France than in England, and more seems to be asked of the French students with regard to this domain of study (Planel et al., 2000).

**Teachers and Pupils.** French teachers, in comparison to those in Denmark and Britain, demonstrated greater distance from this students, placed an emphasis on students’ cognitive (rather than affective) development, and tended to take a knowledge-base approach to learning (Osborn, 2001). In France, the school and teachers’ focus on the child as “pupil” with academic objectives emphasized as the schools main areas of concern (Robinson & Tayler, 1989; Osborn, 2001). This separation of pupil as a sub-role of person may allow for greater feelings of control on the part of students, and may serve as a strong buffer for any negative feedback students might receive (Robinson & Tayler, 1989).

For example, Robinson and Tayler (1989) investigated English and French students self-perceptions as high or low achievers in comparison to their sense of self-confidence and interest in schoolwork. Interestingly, the sampled French students, who considered themselves to be low achievers also reported substantially higher or more positive amounts of self-confidence and interest in school work than did the English students (Robinson & Tayler, 1989). These
researchers suggest that this difference may rest in the distinction of pupil from person, such that any evaluations of pupil do not extend beyond that to otherwise impact students beliefs.

Further, in France there seems to be a preference on the part of both teachers and pupils to maintain distance between these parties (Osborn, 2001). In fact, Osborn (2001) reported that this distance was seen by pupils as “affording a protection against teacher control of the ‘person’ rather than the pupil” (p. 273). Therefore, teachers in France focus on conferring their subject matter to students, so that the students, as a collective, may be encouraged and inspired in the domain (Osborn, 2001).

Effort and Work. Planel (1997) conducted an ethnographic study of English and French primary schools in order to investigate the role of the national culture in learning. In this work, the culture and learning in each country was explored and articulated in light of one another. In this work, Planel (1997) discusses the cultural beliefs about effort and work within each country. Here we focus on her findings relative to France. Planel (1997) suggested that in France there is a strong emphasis on the importance of effort over ability. In this context, both teachers and students seem to attribute student achievement (or lack there of) to the amount of effort exerted. In turn, this emphasis leads to greater feelings of control on the part of students. In this context, students’ sense of control comes from the overriding belief that the pupil could do well if they put forth enough effort (Planel, 1997). Charlot, Bautier, & Rochex (1992) found similar evidence. These researchers concluded that the majority of pupils believed that they have the intellectual capacity to succeed providing they work hard (Charlot, et al., 1992). Thus, student success in school is seen as dependent upon effort, and therefore in control of the student.

Although not articulated in the literature, a second positive outcome of this belief in effort may also be at work in French schools. That is, teachers and parents in France also hold the
belief that if students put forth enough effort they will succeed. This cultural belief in effort may well translate to higher expectations for students at all levels and across all domains. It is important to note that in 1985 Prime Minister Fabius announced the government plan to increase the number of individuals at the *baccalauréat* level to 80% of the age group (Prost, 2000). While some saw this as political posturing or an effort to lower standards, many may have perceived this decision as verification that 80% of the country’s youth were capable to reach this level of education. This is a very strong message, which seems to convey a national belief in the value of effort over ability.

Planel (1997) also explored the meaning of work across the cultural settings of France and England. She found both commonalities as well as differences in how students' described and perceived the meaning of work. In both countries, pupils described work as involving effort, as being under the control of the teacher, and as long and difficult. However, in England students also used the terms bored and fun to describe work. In contrast, pupils in France, described work as independent, marked, and useful (Planel, 1997). Thus, in France the pupils didn't seem to assign an affective orientation to work, but rather, they described the components of work as being an evaluated product that is completed alone and serves a useful purpose. This provides a specific meaning of the term work that is distinct from effort alone. Additionally this distinction across the two cultures was also seen in remarks made by parents as they dropped students off at school in the morning. In England, students were told “bye…have a nice day” where as in France students were told “*Au revoir…travaille bien*” (Bye…work hard – Planel, 1997, p. 368). In France there was a greater emphasis on the work in school, a work ethic, and the instrumental role of work in achieving a career goal (Planel, 1997).
Structure of French Schools

Schools in France can be described in three tiers, *primier degré* or primary school, *second degré* or secondary school, and higher education. Each of these tiers of schooling has some degree of variation, however, wider selections or opportunities are seen as the school level increases. Here we will briefly describe each of these levels of schools with regard to students’ age, the goals of the school level, admission policies, exams, and degrees when appropriated. Further, these specifics are outlined in Tables 1 and 2.

*Primier degré.* The *primier degré* or primary school consists of *maternelle* and *primaire’ élémentaire* (see Table 1 for details). *Maternelle* is most like the American version of preschool. *Maternelle* is open to all children beginning at age three and continues until age six. Students are not required to attend school until age five. The goal of *maternelle* is to provide children with experiences which improve socialization skills and language development (Kherroubi & Plaisance, 2000). Teachers determine whether students are prepared to enter primary school. If the teacher is concerned with a child’s progress, then the child may be kept for an additional year in *maternelle*.

*Primaire’ élémentaire* or primary school is comprised of five grade levels. The goal of this level of schooling is to focus on the “fundamental elements of knowledge” (Kherroubi & Plaisance, 2000, p. 85). *Primaire’ élémentaire* employs a self-contained classroom structure and the use of ability grouping is frowned upon in general (Fowler, 2001). In this level of school, the goal is to prepare all students for *collège* (middle school).

*Second degré.* The second level of school in France includes *collège* or middle school and *lycée* or high school. In *collège* students receive a common curriculum for four years (approximately sixth through ninth grades in the U.S.) and prepare to attend *lycée*. After the
second year of college an orientation process begins. In this process, students guided by teachers and parents are directed towards academic, technical, or vocational programs (Fowler, 2001). Decisions to move students into these programs are made by educators based on students dossiers (akin to portfolios) and teacher recommendations (Fowler, 2001). At the end of college, students are given the opportunity to receive the diplôme national du brevet (the brevet). This is a national certificate students earn based on two components, an exam created by regional authorities and students grades in the final year of college. The brevet is not a requirement for students to attend lycée, rather, the brevet gives students evidence of their academic achievement and provides them with a first experience with an external examination (Fowler, 2001).

Students must apply to attend not only the Lycée (high school) but also to specific programs within each lycée. In general, students apply to the lycée program that they were oriented to in college, that is, academic, vocational, or technical programs (Fowler, 2001). Students might apply to a lycée that specializes in a particular field of study or to a larger school that contains multiple programs. Each program or major in the lycée corresponds to a specific form of the baccalauréat or bac, which students will take upon completion of lycée in preparation for higher education or employment. In fact, one of the main goals of the lycée is to prepare students to take and pass their specific form of the bac. All students who pass the bac are guaranteed admission to university. Additionally, successful passage of some forms of the bac serves as an employment credential (Fowler, 2001).

Higher Education. France offers students four options, two short and two long tracks, for higher education. Table 2 provides an outline of these educational options. All of these options require students to have successfully passed the bac for their intended area of study. Students may attend an Institut Universitaire de Technologie (IUT) or Technological University. These
programs are held at a university and are taught by university professors. Students who successfully complete their course of study at the IUT may receive a diploma and are then ready for the workforce or they may choose to enter the third year of the university or apply to a Grande École (Eicher, 1997). Another short program is the Section de Techniciens Supérieurs (STS). The STS program is offered from a lycée. These are advanced courses in technology programs taught by regular lycée instructors. Students who successfully accomplish this program of study may receive a diploma, the Brevet de Techniciens Supérieurs (Eicher, 1997). These students may then go on to the second year of university, a Grande École, or enter the work force.

Students may choose to enter into a longer university education by enrolling in either a university or a grande école. Either of these options requires at least four years of additional schooling. The university provides mass education for students from a variety of backgrounds. Students enrolled in the university have usually taken the general bac in the social sciences or the humanities (Duru-Bellat, 2000). All students must sit for final exams at the end of each year of university to determine if they can continue in their course of study.

Some students may elect to apply to the elite and prestigious grande écoles. These are institutions of higher education that have traditionally provided education for the country’s elite (Galland & Oberti, 2000). These schools are considered to be the “central institution for intellectual or technical training” (Galland & Oberti, 2000, p. 105). Thus, grande écoles, are highly selective of their students, accepting students of high academic caliber.

Assessment

Fowler (2001) presents a clear and concise overview of the types of and procedures for testing in France. Here we briefly draw from this work and that of Bonnet (1996) to present the
types of assessment administered in France. However, we suggest that you look to the work of Fowler (2001) and Bonnet (1996) for a more specific treatment of these processes.

*Formative Assessments.* The Ministry of National Education, Research, and Technology administers a national evaluation to all beginning third, sixth, and ninth grade students during the second week of each school year (Fowler, 2001). According to Bonnet (1996) the purpose of these assessments is threefold: to provide advice to policy makers, to inform the public, and to initiate changes in the system. By establishing assessments at the beginning of the school year, teachers are expected to use these results to guide their teaching processes. Fowler (2001) suggests that these are not high stakes tests, because neither students’ advancement nor teachers’ rewards or punishments are based on these test scores. Rather, the purpose of these exams is to provide a formative assessment to schools, teachers, and parents in order to guide the lesson planning and professional development activities for teachers (Fowler, 2001).

*The Diplôme National du Brevet.* Students’ are offered the first of two larger scale exams at the end of ninth grade, the *diploôme national du brevet* (*brevet*), or the national certificate diploma. The *brevet* score is based upon two components: students’ overall grades in ninth grade and their performance on the three part *brevet* examination. The exam content covers French, mathematics, and history and geography. This is not a multiple choice, objective type of exam; rather, it is infused with literary selections to analyze, multi-step mathematical problems to solve, and large historical essays to write. However, this exam is still not what we might consider to be a “high stakes test.” The *brevet* is not used to determine admission to *lycee* or to evaluate teachers. Instead, the *brevet* provides evidence of academic achievement for students who do not go on to *lycee* as well as a trial run for those who will later sit for the *baccalauréat.*
The Baccalauréat. The baccalauréat is considered to be a “guarantee of equality against the influences of teachers’ values and schools of different status” (Broadfoot, 1996, p. 50). The baccalauréat is the term used to describe a host of exams which have been created to assess knowledge in many areas of study. Generally, there are three forms of the baccalauréat: academic, technical, and vocational (Fowler, 2001). The academic baccalauréat is taken by students interested in attending a traditional university. There are three version of the academic baccalauréat: French literature, science, and economics and social sciences. All students taking the academic baccalauréat are assessed in the domains of philosophy, French, history/geography, and foreign languages, and then depending on the students’ area of expertise or area of study in lycée they take a specialized section. The technical baccalauréat offers several forms which include the domains of business administration, accounting, lab technology, engineering, performing arts, agriculture, and hotel and restaurant management. The vocational baccalauréat offers two forms, industrial and service, that offer credentials for occupations such as hairdressing or automobile maintenance (Fowler, 2001).

The baccalauréat is the quintessential high stakes exam. Passing the baccalauréat guarantees students free access to higher education and in some fields provides credentials for entering their chosen field. According to Fowler (2001) the baccalauréat is a cultural institution in France, as evidenced by book stores filled with exam preparation materials, media coverage of students sitting for the exam in June, and the publication of the baccalauréat results in a prestigious magazine every January. Thus, it seems that the last three years of lycée are focused on preparing students to sit for and pass the baccalauréat as this becomes the sole measure for school and student success.

Connections across Theoretical Constructs and French Culture
The overview provided here is intended to frame the current study of domain specific epistemological beliefs, goal orientations, and self-efficacy within the context of the French educational culture. This research, then, seeks to explore how these belief systems predominantly studied within the American educational culture manifest in students grounded within the French system and culture. Additionally this study will expand Buehl and Alexander’s (2000) previous work to include learning, performance approach, performance avoidance, and work avoidance goal orientations, reflecting the current goal theory literature (see Midgley, Kaplan & Middleton, 2001; Pintrich, 2000).

Research Questions

The present study then seeks to understand how epistemological beliefs, goal orientations, and self efficacy are articulated by French students. Specifically, we seek to respond to the following questions:

1. What is the factor structure of French students’ beliefs about knowledge in mathematics and history?
2. What is the factor structure of French students’ goal orientations?
3. What are the relationships between French students’ epistemological beliefs, academic goal orientations, self-efficacy and performance on mathematics and spatial reasoning tasks?

Our exploration of the French educational culture led us to hypothesize answers to some of these questions. With respect to epistemological beliefs, we were tentative in our expectations given the lack of prior research of this construct with French participants. However, the structure of the French educational system seemed to support a domain specific understanding of knowledge beliefs. Further, it seemed that a belief in the integration of knowledge in
mathematics would be enhanced by the emphasis in France on mathematics as field of study. Additionally, the belief that effort is associated with knowledge attainment also seemed to be reflective of the French educational culture, and therefore we expected factors to emerge reflecting this belief.

Research on goal orientations has been explored with French participants. This research found goal orientation structures similar to those identified with non-French populations. However, goal orientation research in France has primarily looked at goals relative to sports activity rather than within an academic context. For this reason we decided to conduct an exploratory analysis on the goal orientations of the participants in this study. While we anticipate that the four factor structure found in other cultural groups and with French participants in sports will emerge, we want to allow for the possibility of a divergent factor structure relative to academics.

Finally, we expect a series of relations to be demonstrated among our variables of interest. Specifically, we anticipate that if domain specific epistemological beliefs emerge, that beliefs about the integration of mathematics knowledge will be related to self-efficacy for mathematics as well as performance on a mathematics task assessing crystallized ability. Further, we anticipate that beliefs about the integration of knowledge will be related to mastery goal orientations.

Methodology

Participants

The participants in this study were enrolled at a university in the French Alps. This university enrolls approximately 20,000 students of which about 2,000 come from foreign countries, and is part of a larger university system. At this university social sciences are the
primary focus of study, including such areas as the political sciences, history, psychology, and sociology. For the purposes of our investigation, it was important to establish that the participants had experienced the French educational system. Therefore, any participants who had spent a minimum of six years in French schools, public or private, were omitted from this study. The resulting participant pool consisted of 186 students (from an initial pool of 192). Among these participants 88.7% were female and 11.3% male which is parallel to the general enrollment within this department of the university. The ethnic background of this participant pool was 91.4% Caucasian, 2.2% North-African, 2.2% multiple-ethnicities, 1.1% Middle-Eastern, 0.5% African-American, 0.5% Hispanic-American, and 1.6% did not respond. All of the participants were in their first three years of university. Regardless of the degree they are pursuing, all of these students at this university take courses in social psychology, clinical psychology, cognitive psychology and statistical methods.

Measures

Translations

All of the measures used in this study were originally developed in English. Therefore, specific steps were taken in order to ensure the appropriation translation of items into French. First, the first author, a native French speaker, knowledgeable of the intent of the study, translated all items from English into French. Second, a bilingual native French speaker, blind to the goals of the study, translated the items back into English. Third, a native English speaker from the United States, also blind to the goals of the study, compared the initial version of the
measures to the one that had been translated back into English. This comparison was done to ensure that the meaning of the items did not change in the translations. No major differences were found through this process. Minor issues (e.g., spelling and grammatical errors) were resolved in discussion.

Epistemological Beliefs

The Domain Specific Belief Questionnaire (DBSQ, Buehl, Alexander, & Murphy, 2002) was used to assess students’ domain-specific epistemological beliefs. This measure has been used with American university students and resulted in four factors tapping into students’ beliefs about the integration of knowledge in mathematic and history, and the effort required to obtain knowledge in mathematics and in history. The DBSQ consists of twenty-two items that tap into each of these areas. This measure focuses on mathematics and history as the domains of interest because these areas are thought to be representative of more well-structured (mathematics) and more ill-structured (history) domains. Thus, the measure seeks to assess differences individuals may have in their beliefs about each of these types of domains. For each item, participants responded on a scale where zero indicates strongly disagree and nine indicates strongly agree. An item assessing effort in mathematics is: “Les étudiants qui sont bons en maths doivent travailler dur” (students who are good at math have to work hard). The overall reliability for this measure was $\alpha = .78$.

Goal orientations

Goal orientations were assessed using a 20-item, 10-point scale, in which a zero indicates strongly disagree and nine indicates strongly agree. The instrument was previously employed by Murphy, Buehl, Monoi, and Long (2002) who developed this measure by combining elements of pre-existing measures in an effort to assess students’ mastery, performance-approach,
performance-avoidance, and work-avoidant goal orientations (Meece, Blumenfeld, & Holt, 1988; Midgley et al., 1998). A mastery orientation was assessed using items such as: *Je fais mon travail scolaire parce qu’il m’intéresse* (I do my schoolwork because I am interested in it).

Performance-approach items included: *J’aimerais montrer à mes professeurs que je suis plus intelligent que les autres étudiants de ma classe*, (I’d like to show my teachers that I am smarter than the other students in my class). *Je fais mon travail ainsi les autres n’iront pas penser que je suis bête* (I do my work so others won’t think I am dumb) is an example of items that measure performance-avoidance orientation. A work-avoidance goal orientation was assessed through items such as: *Je veux éviter le travail scolaire* (I want to get out of doing schoolwork). The overall reliability for this measure was $\alpha = .75$.

**Self-Efficacy**

Self-efficacy was measured by a 2-item, ten-point scale (0 = not confident, 9 = very confident) instrument. The phrasing of these efficacy items is similar to other measures of efficacy used in the field (see Bandura, 1997). Two items were used to assess the general level of efficacy participants felt for traditional (*A quel point vous sentez-vous confiant en mathématiques?* How confident do you feel in mathematics?) and novel (*A quel point vous sentez vous confiant en raisonnement spatial?* How confident do you feel in spatial reasoning?) tasks.

**Cognitive Ability Measures**

We included two ability measures in this investigation intended to assess students’ crystallized or schooled abilities and fluid or novel abilities (Ackerman, 1996; Cattell, 1843; Snow & Yalow, 1982). Crystallized abilities represent the knowledge and processes typically acquired as part of formal education, whereas fluid abilities deal with an individual’s ability to
solve more novel or unschooled tasks. Moreover, because this investigation was part of a larger international study of students’ motivations and academic performance, it was also important to minimize the effects of language and culture-specific knowledge and abilities when creating ability measures. Thus, we used a mathematics test to measure students’ crystallized cognitive abilities and a spatial reasoning task to assess their fluid problem-solving abilities.

**Crystallized ability: Mathematics performance task.** The participants were given five minutes to solve seven mathematics problems requiring increasing levels of knowledge. The seven topic areas assessed included: long division, decimals, percentages, fractions, polynomials, calculus, and geometry. For each area, one multiple choice item was provided (e.g. $1053/65 = ?$ a) 16.2, b) 16.3, c) 17, d) 17.05). Distractors for each of these items were designed to target common misconceptions or errors in order to decrease the potential for guessing the correct answers. A detailed description of the distractor selection can be found in Riconscente and Maggioni of this symposium. Participants were allowed to write their reasoning on the paper if they needed but the calculator was strictly forbidden. At the end of five minutes, participants were asked to stop, whether they had completed the measure or not. Items answered correctly were awarded one point. Incorrect or blank responses were marked as zero. The maximum score for this measure was seven.

**Fluid ability: Spatial reasoning performance task.** The spatial reasoning measure was a modification of a measure designed by Kulikowich (1996). In this 10-item instrument, which is similar to the Ravens Advanced Progressive Matrices (Ravens, 1965), a series of eight shapes are presented in a $3 \times 3$ matrix. The final item is left blank and must be deduced by the respondent on the basis of the pattern represented in the given items (see the example which follows). The participants were asked to select the correct response from among four options. Participants were
given five minutes to complete this task. One point was awarded for each correct response. A zero was recorded if there was no response or if it was incorrect. The maximum score for this measure was ten.

Background Information

Participants were asked to complete a general information questionnaire indicating their age, gender, ethnicity and parents’ highest educational level. They were also asked indicate how many academic years they spent in public and in private school and in what country they had attended school. They were also asked to identify how many mathematics and history courses they had taken or were enrolled in currently at the university and how many philosophy courses they have taken in university or high school.

Procedure

At the site for this study, each student group (e.g., freshmen, sophomores) has a public display where information is posted to facilitate communication with students. Therefore, announcements for this research study were posted on these public displays. The posters
advertised that an international research study would be conducted in the building, that participation took approximately 45 minutes, and that students participating would receive extra credit (0.5 point out of 20 on the final exam) in their social psychology course. Interested students were asked to write down their name on the schedule. Multiple time slots were provided to ensure all students had an opportunity to participate.

Students were told that they were participating to an international research about student’s beliefs and knowledge. Participants were informed that the set of the questionnaires had two components. Some questionnaires were timed whereas some were not. They were told to follow the directions and not to fulfill a questionnaire if they were not lead to complete it. Finally they were told that their answers would be confidential and anonymous. At the end of each session a coupon for the extra credit was given to everyone present.

Results and Discussion

Structure of Epistemological Beliefs

The first research question sought to investigate the factor structure of French students’ beliefs about knowledge in mathematics and history. We employed exploratory factor analytic procedures on the data in order to examine the structure of these students’ knowledge beliefs. First, we conducted a principal components analysis to determine the appropriate number of factors to extract. Analysis of Cattell’s scree plot in conjunction with previous work with this measure suggested a four-factor solution which explained 45% of the variance. Second, the data were then subjected to Principal Axis Factoring (PAF) with oblimin rotation. Buehl and colleagues (2002) used similar procedures in their previous work with this measure. An item was considered to load on a factor if its loading was equal to or greater than .300. Items that that demonstrated dual loadings were assigned to factor that seemed to be most theoretically
appropriate. Table 1 provides the items and their respective loadings. Item assignment is indicated by bold faced type and dual loading are highlighted in grey.

Examination of the items loading on the four factors indicated that the French students in this study demonstrate qualitatively different forms of epistemological beliefs than we have seen in previous research of this kind. The first two factors seem to reveal beliefs about the value of effort and the role of work in success regardless of academic domain. The first factor, which we are calling value of effort, includes items that seem to indicate a belief that both mathematics and history can (or cannot) be learned. That is, the process of reviewing in both subject areas is helpful and that it is best to keep trying even if learning the concept takes a long time. This factor seems to demonstrate a general belief that putting forth effort and continuing to try is worth the learner’s time in both domains. The data for this factor demonstrate a reliability of .63.

The second factor, role of work, includes items that reflect the belief that success in either mathematics or history is related to hard work in these fields. The Cronbach’s alpha for the items loading on this factor is .75. The lack of differentiation by domain across these two factors suggests that French students see fields, mathematics and history, as content that can be learned through effort and that success in either field requires some amount of work. This diverges from the findings that have been found among students in the United States, who demonstrated differentiated beliefs about the value of effort and the role of work by academic domain. This suggests that students in France have a qualitatively different perspective on these two domains of knowledge than the previous American samples.

It is important to look closely at the items loading on each of these factors, value of effort and role of work. Planel (1997) explored the meaning and impact of effort and work on French and English students. In this research and that of others, it became clear that in France there
French Connections  40

seems to be a cultural belief that individuals who try hard and put forth effort can succeed. However, in Planel's (1997) work we see that French students distinguish work from effort, and moreover their understanding of work is unique from that of the English students also observed. Specifically, French students see work as involving effort, but also, as something that is done independently, for a useful purpose, and that is evaluated. This distinct understanding of the term work may help to explain the separation of these items onto these two factors.

The remaining two factors, however, demonstrate findings that are similar to previous research. Each of these factors reflects a domain-specific belief about the integration of knowledge. The third factor, integration of mathematics knowledge, \( (\alpha = .70) \) includes items that reflect a belief in the integration of mathematics knowledge. This factor seems to reflect the belief that mathematics is related to other knowledge domains. Further, this factor is quite similar to Buehl et al.'s (2002) integration of mathematics factor, including all but one (item 19) of the same items. The final factor, integration of history knowledge, represents students’ beliefs about the integration of history knowledge. This factor \( (\alpha = .63) \) suggests that history is related to other domains. Factor four is also similar to Buehl and colleagues’ (2002) integration of history factor, including all but two of the same items. The items in this study that previously loaded on this factor are items 13 and 14. In this study, item 13 (It is a good use of time to work on history questions that have no precise answers) loads on the first factor – the value of effort, and item 14 (The information learned in history is useless outside of school) does not load on any factor. All of the items loading on this fourth factor have a negative loading. It is important to note that the sign of a factor loading has no intrinsic meaning in and of itself (Kim & Mueller, 1978). Yet, the signs of items on a given factor do have meaning in relation to other items on that same factor. If items on the same factor differed one would interpret that to mean that the items are
related to the factor in opposite directions (Kim & Mueller, 1978). In the present investigation, however, all of the items have negative loadings on the fourth factor, therefore, all of the items relate to the factor in the same way. High scores on this factor indicate that students have a stronger belief in the integration of knowledge in history whereas low scores on this factor indicate that history knowledge is less integrated and more compartmentalized.

**The Structure of Goal Orientations**

The second research question asked, what is the factor structure of French students’ goal orientations? To examine the nature of the factor structure of these students goal orientations we conducted exploratory factor analytic procedures. First, we employed principal components analysis to identify the number of factors to extract. Here, an examination of the scree plot clearly indicated a four-factor solution, as was anticipated when using this measure. Next, we conducted principal axis factoring with Varimax rotation to identify the factor loadings. Varimax rotation was used because the literature on goal orientations emphasizes the independent nature of each proposed goal factor. Items with loadings equal to or greater than .3 were assigned to a given factor. In cases where dual loadings occur the item was attributed to the factor that made greater theoretical sense. Table 4 presents the goal orientation factors with the item loadings. Item assignment is indicated by bold faced type and dual loading are highlighted in grey.

The factors that emerge in this data demonstrate four goal orientations that have been identified in the literature, performance approach, work avoidance, performance avoidance, and mastery. Factor 1, *performance approach* (α = .83) is comprised of items that reflect students’ desire to approach work in order to achieve external rewards (e.g., I’d like to show my teachers that I am smarter than the other students in my class). Factor 2 (α = .77) reveals a *work avoidant* goal orientation. This factor indicates students’ desire to avoid or get out of doing work
regardless of the level of achievement they attain or others perceive them attaining (e.g., I want to get out of doing school work). A *performance avoidance* goal orientation is reflected in Factor 3 ($\alpha = .78$). This orientation demonstrates students desire to achieve or complete work in order to avoid being poorly perceived by others (e.g., I do my work so others won’t think I am dumb).

The final factor, Factor 4 ($\alpha = .69$) is comprised of items that reflect a *mastery* goal orientation. These items reflect a willingness to participate in learning activities out of intrinsic interest or a desire to learn (e.g., I do my schoolwork because I like to learn new things).

The factor structure of these French students’ goal orientation beliefs is similar to those found in American studies. This suggests that these basic approaches to learning situations may be common across educational cultures.

*Relationships Among Variables*

We conducted a correlation analysis to explore the relationships among French students’ epistemological beliefs, academic goal orientations, self-efficacy and performance on mathematics and spatial reasoning tasks. Table 5 illustrates descriptive information about our variables of interest and correlations are presented in Table 6. Here we will highlight some of the relationships that emerge in this data. Among the epistemological belief factors, it is interesting to note that work beliefs and beliefs about the integration of mathematics are the only two of these factors not to be significantly correlated. This may be understood, given the possibly unique beliefs French students may hold about work and the import of mathematics in the French educational culture. That is, in a system where “work” is considered to be long and difficult, and mathematics is valued throughout the culture, it may make sense that students perceive the integration of mathematics beliefs as unrelated to a “long and difficult” task.
Clearly, these beliefs about mathematics are related to effort beliefs, and the expectation that if you try you can succeed.

Among the goal orientations we see several significant relationships. Mastery goals are positively related to performance approach goals and negatively related to work avoidant goals. Additionally, performance avoidant goals are positively related to performance approach and work avoidant goals. However, there is no significant relationship between mastery and performance avoidant goals. Mastery goals indicate a desire to learn and master content where as performance avoidant goals indicate a desire to avoid looking bad or unintelligent. An examination of the means indicates that on average these students demonstrated stronger mastery goals (mean = 5.96) compared to the other goal orientations. Conversely, performance avoidant goals were on average the lowest of the reported goal orientations (mean = 2.54). This suggests that, among the French students who responded to these measures, a strong desire to master content is unrelated to a desire to avoid looking bad.

Looking across constructs, some interesting relationships are demonstrated particularly with respect to epistemological beliefs and goal orientations. Specifically, students’ beliefs about the integration of knowledge in the domains of mathematics and history are significantly, positively related to mastery goals. This suggests that students’ mastery goals are related to their beliefs about the integration of knowledge for both domains assessed in this study. This indicates a need for further research that explores this relationship, particularly in terms of directionality and the process by which these sets of educational beliefs are related.

The final sets of relationships that we will discuss are the connections to students’ achievement on the mathematics task and their efficacy or confidence for mathematics. First, we see a positive relationship, as expected, between students’ efficacy beliefs and their achievement
on the mathematics’ task. Second, there is a weak but significant relationship between students’ mastery goal beliefs and their achievement on the mathematics task. Third, both achievement on the mathematics task and mathematics efficacy beliefs are significantly related to students’ beliefs about the integration of mathematics knowledge and their mastery goal beliefs. Thus, we are seeing relationships among variables that have independently been considered to be important for student learning. This may indicate that these variables, epistemological beliefs, goal orientations, and efficacy, may also work in concert within learners as they develop.

Conclusions and Implications

French students demonstrated epistemological belief structures that were both similar and distinct from those found in the previous research. This emphasizes the need to create measures of belief constructs within cultural contexts so that meaning within items is consistent with common cultural understandings. The emergence of distinct belief constructs related to effort and work among these participants suggests that even when efforts are made to ensure appropriate translations of terms the cultural meaning or essence of words may not be fully addressed or anticipated.

French students' goal orientations demonstrated a similar structure to what has been found previously in the literature. This indicates that these four orientations, mastery, performance approach, performance avoidant, and work avoidant, may play a role in the motivational perspectives of French students for academic pursuits. Further, this common goal structure suggests that these orientations may be consistent across cultures describing a common phenomenon in the approaches individuals take with respect to achievement tasks.

French students' beliefs about the integration of knowledge in mathematics are related to a mastery orientation, self-efficacy for mathematics, and achievement on a mathematics task.
This indicates that there are multiple forces at work whenever students approach or are involved in a learning task. Future research should look to exploring the ways that these distinct aspects of student belief systems interact and impact one another as well as student learning.

There are some limitations in this study that should be addressed. Specifically, these pertain to our exploration of the French culture as well as methodological issues. The majority of the research used to explore the French educational culture was written in English by both French and non-French researchers. This limits our ability to explore deeper cultural characteristics that may be evident in the culture were we to investigate all the literature, particularly that written by French researchers in their own language. With respect to methodology, we chose to employ measures generated in the United States. This decision limits our ability to understand what, if any, epistemological beliefs or goal orientations may have been generated from within the French context. Further, given this limitation, we are unaware of any additional beliefs or goal that these participants may hold in addition to what we present here. An additional concern related to these measures is our reliance on translation. For example, we contend that the term "work" may have a specific meaning in France that is unique. However, this may be more closely tied to the way in which these items were read and translated rather than to the specific etymology of the word. A much deeper analysis of this term (work, \textit{travailler}) and its meaning in France must be completed before we can ascertain whether there is a distinction between work and effort with respect to knowledge among French learners. Additionally, our sample is limited to students studying psychology, it may be that different belief and goal structures would emerge among students from different areas of study.

Educational psychology, specifically theory and research investigating cognitive and motivational forces, has long been studied without regard for context, either a specific learning
context or a larger educational culture that permeates a society. This study is one effort to demonstrate the unique contributions that a national approach or culture of education has on student beliefs about knowledge, motivation, and their own abilities. We have attempted to provide a description of the French educational culture as view form the established literature, however, a deeper understanding of what educational culture means at both a national and international level is needed. Moreover, the understanding a nation's educational culture and the effects of that culture on cognition and learning, must be sought through extensive collaboration, discourse and research. This work is but a stepping stone to the achievement of that understanding.
References


*Journal of Education Policy, 15*, 51-60.


Sarrazin, Roberts, Cury, Biddle, and Famose (in press).


<table>
<thead>
<tr>
<th>Age</th>
<th>School</th>
<th>Description of School</th>
<th>Admission/Availability</th>
<th>Exams</th>
<th>Certificates/Diplomas</th>
<th>Leads to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Primier degree</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-6</td>
<td><strong>Maternelle</strong> Preschool – first 3 years of primary school</td>
<td>Emphasis on preparation for primary school and social development.</td>
<td>Open to all, but not mandatory until age 5</td>
<td>CP 1</td>
<td>N/a</td>
<td>Primary</td>
</tr>
</tbody>
</table>
| 6-11| **Primaire’ elementaire** Primary School                                               | o Purpose to prepare student for college  
   o 5 levels (grades)  
   o Self-contained classes | Available and compulsory to all | CP 2 in last year. |                       | College           |
|     |        | **Second degree**                                                                      |                        |            |                       |                   |
| 11-15| **College** Middle School                                                             | o 4 levels (grades)  
   o Common curriculum  
   o Heterogeneous grouping (Fowler, 2001)  
   o 7th grade orientation process begins | Available and compulsory to all who pass grade 5 | Diplôme National du Brevet | Diplôme National du Brevet | 9th grade orientation to Lycee:  
   o Academic  
   o Technologica l  
   o Vocational Workplace |                      |
| 15-18| **Lycee** High School                                                                 | Application to specific Lycee and/or Type:  
   o Academic  
   o Technological  
   o Vocational | Baccalauréat  
   o Academic  
   o Technological  
   o Vocational | Baccalauréat  
   o Academic  
   o Technological  
   o Vocational | Baccalauréat  
   o Academic  
   o Technological  
   o Vocational | Depends on specialization  
   o Workforce  
   o University  
   o IUTs  
   o STS  
   o Grande Écoles |
Table 2
French School Organization: Higher Education

<table>
<thead>
<tr>
<th>School</th>
<th>Description of School</th>
<th>Admission/ Availability</th>
<th>Exams</th>
<th>Certificates/ Diplomas</th>
<th>Leads to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Tracks (2-3 years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IUT: Institut universitaire de Technologie Technological University</td>
<td>Located in a University, courses taught by university professors;</td>
<td>Bac + Special Sections</td>
<td></td>
<td>DUT: Diplome universitaire de Technologie delivre dans un IUT</td>
<td>o Workforce</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>o Third year of university/ Grande École</td>
</tr>
<tr>
<td>STS: Section de Techniciens Superieur</td>
<td>Located in Lycee, courses taught by Lycee instructors.</td>
<td>Bac + Special Sections</td>
<td></td>
<td>BTS: Brevet de Techniciens superierus</td>
<td>o Workforce</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>o Second year of university/Gran de École</td>
</tr>
<tr>
<td>Long Tracks (4 or more years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University</td>
<td>o Provides mass education.</td>
<td>Passing the bac guarantees Acceptance. Usually the General bac in Social Science (ES) or Humanities (L) (Durubellat, 2000)</td>
<td></td>
<td>Final exam at the end of each year</td>
<td>o Deug: the diploma after 2 years of university</td>
</tr>
<tr>
<td></td>
<td>o Educates country’s teachers and middle managers (Galland &amp; Oberti, 2000)</td>
<td></td>
<td></td>
<td></td>
<td>o Licence: 1 year after the Deug</td>
</tr>
<tr>
<td></td>
<td>o Funded by the state</td>
<td></td>
<td></td>
<td></td>
<td>o Maitrise: 1 year after Licence</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>o DESS: On to workplace</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>o DEA: Doctoral degree</td>
</tr>
<tr>
<td>Grande Écoles</td>
<td>Central institute for intellectual or technological training. Highly selective, educate the countries elite, are not funded by the state (Galland &amp; Oberti, 2000).</td>
<td>Acceptance requires: Academic/General Bac specializing in Science (BacS)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3
Factor Loadings for DSBQ

<table>
<thead>
<tr>
<th>Belief Items</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor 1: Value of Effort, ( \alpha = .63 )</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Reviewing the material discussed in class would help a student learn history.</td>
<td>.664</td>
<td>.156</td>
<td>.038</td>
<td>-.211</td>
</tr>
<tr>
<td>8. Reviewing the material discussed in class would help a student learn math.</td>
<td>.557</td>
<td>.184</td>
<td>-.010</td>
<td>-.137</td>
</tr>
<tr>
<td>16. Even if it takes a long time to learn a math concept, it is best to keep trying.</td>
<td>.469</td>
<td>.137</td>
<td>.199</td>
<td>-.126</td>
</tr>
<tr>
<td>6. Even if it takes a long time to learn a history concept, it is best to keep trying.</td>
<td>.435</td>
<td>.091</td>
<td>.258</td>
<td>-.380</td>
</tr>
<tr>
<td>13. It is a good use of time to work on history questions that have no precise answers.</td>
<td>.414</td>
<td>.135</td>
<td>.198</td>
<td>-.176</td>
</tr>
<tr>
<td><strong>Factor 2: Role of Work, ( \alpha = .75 )</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. How successful students are in mathematics has no relationship to how hard they work.*</td>
<td>-.027</td>
<td>.846</td>
<td>-.046</td>
<td>-.105</td>
</tr>
<tr>
<td>12. Students who are good at math have to work hard.</td>
<td>.247</td>
<td>.634</td>
<td>.143</td>
<td>-.174</td>
</tr>
<tr>
<td>9. There is a relationship between the number of hours students study and how well they do in mathematics.</td>
<td>.111</td>
<td>.580</td>
<td>.047</td>
<td>-.213</td>
</tr>
<tr>
<td>3. How successful students are in history is related to how hard they work.</td>
<td>.385</td>
<td>.512</td>
<td>.116</td>
<td>-.013</td>
</tr>
<tr>
<td>22. The number of hours students study is unrelated to how well they do in history.*</td>
<td>.272</td>
<td>.510</td>
<td>.130</td>
<td>.064</td>
</tr>
<tr>
<td>1. Students who are good at history have to work hard.</td>
<td>.450</td>
<td>.347</td>
<td>.244</td>
<td>-.076</td>
</tr>
<tr>
<td><strong>Factor 3: Integration of Mathematics Knowledge, ( \alpha = .70 )</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Information learned in mathematics is useful outside of school.</td>
<td>.113</td>
<td>-.022</td>
<td>.845</td>
<td>-.122</td>
</tr>
<tr>
<td>21. Mathematics is unrelated to day to day life.*</td>
<td>.038</td>
<td>.105</td>
<td>.681</td>
<td>-.096</td>
</tr>
<tr>
<td>4. There are links between mathematics and other disciplines.</td>
<td>.178</td>
<td>-.106</td>
<td>.542</td>
<td>-.317</td>
</tr>
<tr>
<td>20. It is important for students to integrate new ideas in math with what they already know.</td>
<td>.277</td>
<td>.026</td>
<td>.538</td>
<td>-.397</td>
</tr>
<tr>
<td>17. It is a waste of time to work on math problems that have no precise answers.*</td>
<td>.266</td>
<td>.038</td>
<td>.310</td>
<td>.018</td>
</tr>
<tr>
<td><strong>Factor 4: Integration of History Knowledge, ( \alpha = .63 )</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. There are links between history and other disciplines.</td>
<td>.293</td>
<td>.209</td>
<td>.174</td>
<td>-.687</td>
</tr>
<tr>
<td>11. It is important for students to integrate new ideas in history with what they already know.</td>
<td>.277</td>
<td>.097</td>
<td>.236</td>
<td>-.607</td>
</tr>
<tr>
<td>7. History relates to day to day life.</td>
<td>.430</td>
<td>.118</td>
<td>.061</td>
<td>-.450</td>
</tr>
<tr>
<td>2. A history question can be approached in several different ways.</td>
<td>.360</td>
<td>-.039</td>
<td>.116</td>
<td>-.305</td>
</tr>
<tr>
<td>14. The information learned in history is useless outside of school.*</td>
<td>.043</td>
<td>.224</td>
<td>-.051</td>
<td>.005</td>
</tr>
<tr>
<td>19. There is only one way to approach a math problem.*</td>
<td>.022</td>
<td>.168</td>
<td>.224</td>
<td>-.247</td>
</tr>
</tbody>
</table>

*Reverse coded items.*
### Table 4
Factor Loadings for the Goal Measure

<table>
<thead>
<tr>
<th>Goals Items</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor 1: Performance Approach  ( \alpha = .83 )</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. I want to do better than the other students in my classes.</td>
<td>.851</td>
<td>-5.7E-02</td>
<td>3.7E-02</td>
<td>.164</td>
</tr>
<tr>
<td>17. Doing better than other students in school is important to me.</td>
<td>.784</td>
<td>9.4E-03</td>
<td>.105</td>
<td>.144</td>
</tr>
<tr>
<td>5. I’d like to show my teachers that I am smarter than the other students in my class.</td>
<td>.681</td>
<td>1.7E-02</td>
<td>.162</td>
<td>-4.7E-02</td>
</tr>
<tr>
<td>16. I would feel really good if I were the only one who could answer the teachers’ questions in class.</td>
<td>.587</td>
<td>.120</td>
<td>.249</td>
<td>-1.3E-02</td>
</tr>
<tr>
<td>7. I would feel successful in school if I did better than most of the other students.</td>
<td>.549</td>
<td>3.5E-02</td>
<td>.250</td>
<td>1.9E-02</td>
</tr>
<tr>
<td><strong>Factor 2: Work Avoidance ( \alpha = .78 )</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. I want to get out of doing schoolwork.</td>
<td>-9.3E-03</td>
<td>.817</td>
<td>5.1E-02</td>
<td>-.192</td>
</tr>
<tr>
<td>6. I wish I didn’t have to do schoolwork.</td>
<td>-1.6E-02</td>
<td>.660</td>
<td>-5.9E-03</td>
<td>-.141</td>
</tr>
<tr>
<td>15. I want to do things as easily as possible so I won’t have to work very hard.</td>
<td>2.6E-02</td>
<td>.636</td>
<td>.172</td>
<td>-9.1E-02</td>
</tr>
<tr>
<td>10. I just want to do enough schoolwork to get by.</td>
<td>-.119</td>
<td>.474</td>
<td>.171</td>
<td>-.394</td>
</tr>
<tr>
<td>2. I want to get others to do the work for me.</td>
<td>.106</td>
<td>.465</td>
<td>.206</td>
<td>-.196</td>
</tr>
<tr>
<td><strong>Factor 3: Performance Avoidance ( \alpha = .78 )</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. I do my work so my teachers don’t think I know less than others.</td>
<td>.290</td>
<td>.134</td>
<td>.760</td>
<td>5.5E-02</td>
</tr>
<tr>
<td>9. I do my schoolwork so I don’t embarrass myself.</td>
<td>8.4E-02</td>
<td>8.9E-02</td>
<td>.519</td>
<td>-9.5E-02</td>
</tr>
<tr>
<td>12. I do my work so others won’t think I am dumb.</td>
<td>.321</td>
<td>.157</td>
<td>.713</td>
<td>-1.5E-02</td>
</tr>
<tr>
<td>20. One of my main goals is to avoid looking like I can’t do my work.</td>
<td>.199</td>
<td>.193</td>
<td>.576</td>
<td>-8.5E-02</td>
</tr>
<tr>
<td><strong>Factor 4: Mastery ( \alpha = .69 )</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. I do my schoolwork because I like to learn new things.</td>
<td>1.3E-02</td>
<td>-.311</td>
<td>-3.4E-02</td>
<td>.709</td>
</tr>
<tr>
<td>3. I do my schoolwork because I am interested in it.</td>
<td>-5.5E-02</td>
<td>-.194</td>
<td>-.168</td>
<td>.667</td>
</tr>
<tr>
<td>13. I like schoolwork that I learn from, even if I make a lot of mistakes.</td>
<td>2.9E-02</td>
<td>-.142</td>
<td>.103</td>
<td>.578</td>
</tr>
<tr>
<td>4. I like schoolwork best when it really makes me think.</td>
<td>.121</td>
<td>-3.9E-02</td>
<td>-4.9E-02</td>
<td>.547</td>
</tr>
<tr>
<td>8. I do my work in school because I want to get better at it.</td>
<td>.239</td>
<td>-.122</td>
<td>.312</td>
<td>.309</td>
</tr>
<tr>
<td>1. It’s very important to me that I don’t look stupid in my classes.</td>
<td>.291</td>
<td>-5.7E-02</td>
<td>.189</td>
<td>1.6E-02</td>
</tr>
</tbody>
</table>
Table 5
Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Mode</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort Beliefs</td>
<td>5.77</td>
<td>1.19</td>
<td>6.00</td>
<td>2.60</td>
<td>8.8</td>
</tr>
<tr>
<td>Work Beliefs</td>
<td>5.15</td>
<td>1.48</td>
<td>5.00</td>
<td>.83</td>
<td>8.67</td>
</tr>
<tr>
<td>Integration of Mathematics</td>
<td>5.69</td>
<td>1.514</td>
<td>7.00</td>
<td>1.80</td>
<td>9</td>
</tr>
<tr>
<td>Integration of History</td>
<td>6.27</td>
<td>1.33</td>
<td>6.25</td>
<td>3.00</td>
<td>9</td>
</tr>
<tr>
<td>Performance Approach</td>
<td>3.33</td>
<td>1.96</td>
<td>2.00</td>
<td>0</td>
<td>7.8</td>
</tr>
<tr>
<td>Work Avoidant</td>
<td>3.12</td>
<td>1.64</td>
<td>2.60</td>
<td>0</td>
<td>8.00</td>
</tr>
<tr>
<td>Performance Avoidant</td>
<td>2.54</td>
<td>1.75</td>
<td>2.5</td>
<td>0</td>
<td>8.5</td>
</tr>
<tr>
<td>Mastery</td>
<td>5.96</td>
<td>1.34</td>
<td>6</td>
<td>1.6</td>
<td>9</td>
</tr>
<tr>
<td>Math Task</td>
<td>3.20</td>
<td>1.44</td>
<td>4</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Spatial Task</td>
<td>7.31</td>
<td>1.56</td>
<td>9</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Math Efficacy</td>
<td>4.33</td>
<td>2.12</td>
<td>6</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Spatial Efficacy</td>
<td>4.41</td>
<td>2.22</td>
<td>3</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Math Courses</td>
<td>2.88</td>
<td>2.17</td>
<td>2</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>History Courses</td>
<td>0.10</td>
<td>.35</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 6
Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.Effort Beliefs</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Work Beliefs</td>
<td>.317**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Integration of Mathematics</td>
<td>.266**</td>
<td>.105</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Integration of History</td>
<td>.486**</td>
<td>.217**</td>
<td>2.39**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Performance Approach</td>
<td>.149*</td>
<td>.082</td>
<td>.068</td>
<td>.050</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Work Avoidant</td>
<td>-.188*</td>
<td>-.217**</td>
<td>-.096</td>
<td>-.150*</td>
<td>.021</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Performance Avoidant</td>
<td>-.054</td>
<td>.019</td>
<td>-.011</td>
<td>.041</td>
<td>.411**</td>
<td>.285**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Mastery</td>
<td>.362**</td>
<td>.138</td>
<td>.220**</td>
<td>.439**</td>
<td>.183*</td>
<td>-.413**</td>
<td>.008</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Spatial Task</td>
<td>.051</td>
<td>.057</td>
<td>.176*</td>
<td>.092</td>
<td>-.044</td>
<td>.067</td>
<td>-.147*</td>
<td>-.088</td>
<td>.254**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Math Efficacy</td>
<td>.094</td>
<td>-.002</td>
<td>.429**</td>
<td>.105</td>
<td>.170*</td>
<td>-.010</td>
<td>.087</td>
<td>.212**</td>
<td>.382**</td>
<td>.142</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Spatial Efficacy</td>
<td>.190**</td>
<td>-.014</td>
<td>.317**</td>
<td>.151*</td>
<td>.140</td>
<td>.007</td>
<td>-.082</td>
<td>.224**</td>
<td>.286**</td>
<td>.122</td>
<td>.417**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Math Courses</td>
<td>.195**</td>
<td>.022</td>
<td>.096</td>
<td>.022</td>
<td>.124</td>
<td>-.158*</td>
<td>-.205**</td>
<td>.220**</td>
<td>.220**</td>
<td>-.021</td>
<td>.186*</td>
<td>.264*</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14. History Courses</td>
<td>-.020</td>
<td>.003</td>
<td>.031</td>
<td>.054</td>
<td>.029</td>
<td>-.061</td>
<td>-.008</td>
<td>.133</td>
<td>.015</td>
<td>-.108</td>
<td>-.066</td>
<td>-.080</td>
<td>-.027</td>
<td>1</td>
</tr>
</tbody>
</table>

Note.

**  Correlation is significant at the 0.01 level (2-tailed).
*  Correlation is significant at the 0.05 level (2-tailed).