The Portrayal of Intelligence in Introductory Educational Psychology Textbooks

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Because of the importance of students' and teachers' implicit beliefs about intelligence, we designed a study to determine: (a) How is intelligence defined—as a malleable or fixed entity—in introductory educational psychology textbooks? and (b) To what extent are classroom applications of intelligence topics included in the textbooks? We conducted a content analysis of the intelligence topics presented in 11 introductory educational psychology textbooks and identified 19 intelligence topics. The texts generally defined intelligence as involving adaptive behavior and problem solving. The amount of pages devoted to classroom application was less than the amount devoted to explaining the topics. We provide implications for instructors and textbook authors. For example, instructors should consider how they can best help students make sense of the variety of intelligence topics and theories. They should also design activities that ask students to think about and make explicit their beliefs about intelligence.

The topic of intelligence can be difficult to teach for educational psychology instructors due to the multitude, complexity, and variation of intelligence theories (Sternberg, 2007). In introductory educational psychology courses, little time is available in the curriculum to devote to an in-depth exploration of intelligence theories because of the range of other topics that are also included in the course. Yet, intelligence is an important topic because students' implicit beliefs about intelligence can influence their beliefs and behaviors (Dweck, 1999; Sternberg, 2000) and these intelligence beliefs have been found to be affected by *teachers'* conceptions of intelligence (Oakes, Wells, Jones, & Datnow, 1997; Watanabe, 2006). Consequently, changing, or even challenging, preservice teachers' beliefs about intelligence could influence their teaching approaches and interactions with their students.

An obvious place to intervene and challenge preservice teachers' implicit theories of intelligence would be in their introductory educational psychology courses. These types of courses likely influence their beliefs through the way in which intelligence is portrayed in the texts they read and the instruction they receive. However, it is not known whether introductory educational psychology textbooks, in which intelligence is addressed, present intelligence as a fixed or malleable trait. The purpose of this study was to examine how topics related to intelligence are presented in introductory educational psychology textbooks. This study was guided by two general research questions: (a) How is intelligence defined—as a malleable or fixed entity—in introductory educational psychology textbooks? and (b) To what extent are classroom applications of intelligence topics included in the textbooks?

Examining how textbooks portray intelligence can better inform instruction for those who teach educational psychology. If intelligence is

not clearly defined or is presented from only one perspective (e.g., malleable or fixed), then instructors may want to include supplementary material that could help preservice teachers further refine their views of intelligence. Furthermore, if little information about how to apply intelligence theories is provided in the texts, instructors might want to include more practical applications in their instruction.

Malleability of Intelligence

If there is a strong relationship between teachers' views of intelligence and students' views of intelligence, then the need for teachers to support malleable beliefs about intelligence and ability is critical to encouraging developing learners. Students' implicit beliefs about the nature of intelligence and ability are important factors affecting their academic motivation and achievement (Dweck, 1999; Dweck & Leggett, 1988). A fixed view of intelligence induces students to view their academic performance as a direct reflection of their intelligence or ability (Dweck, 1999). Students who view intelligence as fixed may perceive academic challenges as threats, avoid obstacles and subsequently sacrifice learning opportunities, and concern themselves about the amount of their intelligence. These students often attribute failure and effort to lower ability and may only persist at a challenge if they believe it will prove that they are intelligent. Additionally, students with a fixed view of intelligence are prone to adopt performance goals (Blackwell, Trzesniewski, & Dweck, 2007), which are less likely to support mastery learning (Meece, Anderman, & Anderman, 2006).

In contrast, students who believe that intelligence can be changed are more likely to ascribe to mastery or learning-oriented goals (Dweck, 1999). Mastery goals emphasize learning and understanding and encourage persistence through goal attainment. These students believe they can improve their intelligence through effort, learning, persistence, and strategy use. When faced with a challenge, students with incremental views of intelligence are more likely to exhibit effort and view the challenge as a stimulus for learning. As a result, incremental views of intelligence and mastery-goal orientations are associated with positive achievement patterns (Blackwell et al., 2007; Meece et al., 2006). This orientation can lead to enhanced conceptual understanding, positive perceptions of ability, and higher self-efficacy. Students with mastery goals feel more optimistic about school and are generally more intrinsically motivated (Anderman, Urdan, & Roeser, 2005).

Beliefs about the relationship between ability and effort are also relevant to the discussion of implicit beliefs about intelligence. By examining how children's beliefs about ability and effort are related, Nicholls (1990) identified four different levels. At the first level, ages 3 to 5, children do not differentiate between ability and effort. They believe that people who put forth more effort are smarter, and vice versa, smart people try harder. At the second level, ages 6 to 8, effort is seen as the cause of outcomes regardless of ability. Around age 9 or 10, children reach the third level where they begin to understand, but may not fully believe, that ability can interact with effort to affect outcomes. The final level is reached at about age 12, when children

view ability and effort as entities that often co-vary (Nicholls, 1978). For example, a person with a higher ability would have to put forth less effort than a person who has a lower ability.

Teachers' Beliefs about Intelligence

As teachers interact with students in the classroom, they make judgments concerning students' intelligence and abilities (Georgiou, 2008; Pretzlik, Olsson, Nabuco, & Cruz, 2003). Teachers' judgments, along with their implicit views of intelligence and ability, can influence their classroom practice, their relationships with students, and students' self-perceptions (Oakes, Wells, Jones, & Datnow, 1997; Pretzlik et al., 2003; Watanabe, 2006). Furthermore, a school's culture can be influenced by these conceptions of intelligence and ability. Oakes et al. (1997), in their discussion of detracking reform, noted several aspects of conventional views of intelligence which may contribute to tracking and influence teachers' classroom practice, including that (a) intelligence is an innate, fixed entity; (b) intelligence is unidimensional; (c) intelligence is easily assessed; (d) intelligence falls along a normal bell curve; and (e) intelligence can be explained by racial and cultural differences. Oakes et al. (1997) argued that teachers who embrace these conceptions of intelligence and ability will lessen their perceived responsibility for students' learning, thus, having negative effects on their teaching and students' learning.

A case study by Watanabe (2006) examined teachers' perceptions of tracking along with ability and intelligence with inquiry groups. Watanabe acknowledged that teachers need to examine their "deeply rooted conceptions of ability and intelligence" (p. 28) for detracking reform. Teachers' examination of their conceptions is important because they can ineffectively utilize detracking if they fail to acknowledge their own beliefs about intelligence and ability. Watanabe argued that teachers who view ability and intelligence as a fixed entity are less likely to employ strategies that will help struggling learners because they do not think the students' low skills are within their control. Watanabe illustrates this with a dialogue between two teachers about students' writing ability: a high school English teacher and a high school health teacher. The health teacher is upset with her students' writing ability and complains about their performance on written assignments; however, each time the English teacher suggests various strategies or interventions for improving their writing, the health teacher states that the students did not learn correct grammar during the critical learning years and that there is nothing she can do about that. Although most teachers may not express their belief that intelligence is innate, Watanabe found that these ideas are often expressed in their conversations about classroom practice.

Whereas some researchers have examined teachers' beliefs about intelligence to determine whether they view intelligence as malleable, others have examined teachers' beliefs about the influence of heredity on intelligence. Walker and Plomin (2005) studied teachers' and parents' perceptions of nature and its influence on five "educationally relevant" behavioral traits. They found that teachers perceived genetics to be at least as important as the environment in

its influence on personality, intelligence, learning difficulties, and mental illness. However, they believed that behavioral problems were more likely to be influenced by the environment than genetics. Walker and Plomin noted that the majority of the teachers had no training on the topic of genetics. Parents also reported similar views of genetics and environment on these behavioral traits. Although Walker and Plomin support research on the genetic influence on these domains and believe that intelligence is heavily influenced by heredity, other researchers are less likely to advocate for genetic predispositions. However, Walker and Plomin's study does reveal a disposition among teachers to explain intelligence in terms of genetics, which could lead them to hold more fixed views of intelligence. Georgiou (2008) found similar results among experienced teachers who believed that hereditary characteristics, including intellectual abilities and gender, played more of a role in student achievement; less experienced teachers, however, believed that effort affected school achievement the most. Although it appears that most novice teachers realize the importance of effort and are not as likely to believe that heredity affects intelligence, it is still important to focus on challenging preservice teachers' beliefs about intelligence so that they do not have a simplistic concept of intelligence and how it will play out in their instructional environments.

Other studies related to teachers' beliefs about intelligence have investigated the relationship between teachers' and students' views. Pretzlik and Chan (2003) believe that teachers' judgments can influence how students perceive themselves and how their peers perceive them. Therefore, understanding how teachers' perceptions of intelligence can affect their students' self-perceptions or perceptions of others is important (Pretzlik et al., 2003). Pretzlik et al. (2003), in their study with primary school teachers in England and Portugal, determined that teachers' implicit views of intelligence were very similar to what is measured by IQ tests and that students' self-perceptions as learners reflect their teachers' views of students' intelligence. Furthermore, teachers highly valued verbal ability over mathematical ability in their views of intelligence.

Another study by Pitkänen and Nunes (2001) documented that teachers' perceptions served as significant predictors of students' self-perceptions as learners. They asserted that students' interactions with others, including their classroom teacher, play an important role in their perceptions, along with the feedback they receive when they succeed or fail in their classroom tasks; this is also consistent with what other researchers have noted (i.e., Cain & Dweck, 1989; Dweck & Bempechat, 1983).

With such positive outcomes related to incremental views of intelligence and mastery-goal orientations, the need to support these views becomes critical. Moreover, with researchers beginning to find a strong relationship between teachers' conceptions of intelligence and students' self-conceptions of intelligence, it becomes important to analyze how intelligence is presented in teacher preparation programs. We want to note that we are not advocating that teachers need to believe that intelligence is 100% changeable. Rather, given the importance of malleable beliefs, we

believe that it is important for students multifaceted and that intelligence can be increased through training and effort (Sternberg & Williams, 2002). In a K-12 classroom setting, acknowledging malleable intelligence may simply be the belief that any student without a severe disability is capable of learning the curriculum content.

The Nature of Beliefs

Thus far, we have argued that teachers' beliefs about the malleability of intelligence are important because they can affect their students' beliefs, which in turn, can affect students' motivation and achievement. Given the centrality of "beliefs" to this discussion, it is important to consider its definition. Beliefs are often contrasted with "knowledge," with some scholars claiming that these two constructs are synonymous (e.g., Lewis, 1990) and others noting that there are important differences between them (e.g., Nespor, 1987). It is beyond the scope of this paper to examine this issue in detail (see Pajares, 1992, for further discussion), but a few related points are worth considering. First, it is commonly accepted that knowledge is based on objective facts that can be externally verified, whereas beliefs are evaluations and judgments that individuals perceive as true or want to be true (Murphy & Mason, 2005; Pajares, 1992). This distinction is relevant for the present study because textbooks can only provide facts that students may or may not "learn" as knowledge. What is unknown is how this knowledge will affect any one student's beliefs about intelligence.

We contend, as others have suggested (e.g., Ernest, 1989; Pajares, 1992), that examining beliefs is critical and teachers to realize that intelligence is because of their powerful effects on understanding and predicting how teachers make decisions. Dweck (1999), who has conducted much of the research related to beliefs about intelligence, calls beliefs "meaning systems" and notes "how people's beliefs about themselves (their self-theories) can create different psychological worlds, leading them to think, feel, and act differently in identical situations" (p. xi). She further explains that individuals' beliefs about intelligence are malleable and that even though students hold longstanding beliefs, she has demonstrated in her research that these beliefs can, at least temporarily, be changed (Dweck, 1999). In the following section, we discuss how information in textbooks may or may not be able to change students' beliefs.

The Influence of Textbooks on Students' Beliefs and Learning

Most textbooks, including most introductory educational psychology textbooks, are written in an expository style. In other words, they are written in a style that just explains the concept that is being covered. This style does little to change students' beliefs (Guzzetti, 2000). Refutational text, on the other hand, has been found to be effective in challenging preservice teachers' epistemological beliefs (Gill, Ashton, & Algina, 2004; Salisbury-Glennon & Stevens, 1999). According to Gill et al. (2004), "Refutational text is designed to stimulate conceptual change by fostering students' dissatisfaction with their current beliefs through rebuttal of those beliefs using scientific evidence (Guzzetti et al., 1993)" (p. 169). Refutational text has also been found to be more interesting to students than text written in a standard (nonrefutational)

format (Guzzetti, 2000) for students at various levels, including elementary school age students (Mason, Gava, & Boldrin, 2008).

Salisbury-Glennon and Stevens (1999) examined preservice teachers' beliefs about motivation. Students reading a standard textbook passage about motivation had less conceptual change than students reading a refutational text about motivation, as measured by questionnaires on motivational theories and strategies. Students reading the refutational text also had a greater change in their knowledge, outperforming students reading the standard passage on a posttest. This effect continued to be found a week later.

Gill et al. (2004) studied preservice teachers' implicit beliefs about mathematics. Students receiving the instructional intervention of refutational text and augmented activation experienced a greater change in implicit beliefs about mathematics than those students who only read a traditional text. It is not known if the augmented activation or the refutational text were more likely to produce the greater effect. Additionally, the effect of conceptual change over time was not measured in this study. However, as Gill et al. note, Guzzetti's (2000) research indicated that only refutational text has demonstrated conceptual change effects lasting at least a month or more.

Method

Textbook Selection

We chose 11 current introductory educational psychology texts for analysis after consultation with eight major textbook publishers. We contacted the publishers, asked them to identify their best-selling introductory educational psychology texts, and obtained the most recent editions of these texts to include in our analysis. Based on the information we obtained from the publishers and our informal discussions with educational psychologists at other universities, we selected what we believed to be the most commonly used textbooks in introductory educational psychology courses across institutions of higher education in the United States. Because we did not want to choose more than one text by any one author, we eliminated one of the textbooks. The final textbooks included in our analysis are identified in Table 1 in alphabetical order by author. Only six publishing companies are identified because the other two publishers are subsidiaries of Pearson.

Table 1. *Educational Psychology Textbooks Included in the Analysis*

Authors	Title	Year	Publisher
Alexander	*Psychology in Learning and Instruction*	2006	Prentice Hall
Eggen & Kauchak	*Educational Psychology: Windows on Classrooms*	2007	Pearson
Fetsco & McClure	*Educational Psychology: An Integrated Approach to Classroom Decisions*	2005	Pearson
Jordan & Porath	*Educational Psychology: A Problem-Based Approach*	2006	Pearson
O'Donnell, Reeve, & Smith	*Educational Psychology: Reflection for Action*	2007	Wiley & Sons
Ormrod	*Educational Psychology: Developing Learners (6th ed)*	2008	Pearson
Santrock	*Educational Psychology (3rd edition)*	2008	McGraw Hill
Slavin	*Educational Psychology: Theory and Practice (8th ed)*	2006	Pearson
Snowman & Biehler	*Psychology Applied to Teaching (11th ed)*	2006	Houghton Mifflin
Sternberg & Williams	*Educational Psychology*	2002	Allyn & Bacon
Woolfolk	*Educational Psychology Active Learning Edition (10th ed)*	2008	Pearson

Text Analysis

The coding protocol included the following questions: (a) What is the single, explicit definition of intelligence provided? (b) Which is the main chapter in which intelligence is covered? (c) Which intelligence theories are covered and to what extent? and (d) To what extent are the applications of intelligence theories included? To determine the authors' definitions of intelligence, we selected only explicitly stated definitions to avoid having to infer their definition. Often, the authors who included explicit definitions did so in the outside column of the page in the same manner that they used throughout the textbook to define important terms.

We determined what parts of the textbook included intelligence topics by consulting the index of each textbook. Page numbers under the headers of *intelligence*, *IQ*, *IQ testing*, *heredity*, *environment*, *attribution*, and *incremental/entity* were included in the analysis. *Attribution* was included because the distinction between effort and fixed ability/aptitude attributions is similar to that between malleable and fixed intelligence views. To determine the main chapter in which the topic of intelligence was presented, we noted the main chapter number and title where the majority of text related to intelligence was covered. We did so to better understand how the authors categorized intelligence in relation to other educational psychology topics covered in the text.

The primary means of analysis was a content analysis of the text (Krippendorff, 2004). We conducted a preliminary review of the selected texts to prepare an initial list of intelligence topics. We revised the list as needed during the content analysis to ensure that we did not miss any major topics related to intelligence, as covered in the selected texts. After revision, the protocol included 19 topics that we used to code for all of the texts. For a unit of text to be coded, it had to include more than one sentence about the topic and intelligence had to be the main concept of the paragraph. The average inter-rater reliabilities for each text were as follows: Alexander (87.50%); Eggen and Kauchak (83.3%); Fetsco and McClure (88.50%); Jordan and Porath (84.2%); O'Donell, Reeve, and Smith (91.7%); Ormrod (89.3%); Santrock (92.0%); Slavin (73.7%); Snowman and Biehler (81.8%); Sternberg and Williams (91.2%); and Woolfolk (92.0%).

We coded *mental retardation* and *giftedness* only if they were presented in the main chapter on intelligence. When these two topics were covered elsewhere, we only coded them if "intelligence" was explicitly stated. We coded entire sections of *attribution theory* because we found it difficult to isolate the parts of the text that related directly to beliefs about the malleability of intelligence (such as those related to effort vs. ability attributions). Often the entire section on attribution theory was important for the reader to understand how making effort attributions (malleable intelligence) could motivate students differently than making ability attributions (fixed intelligence). We did not code *learning disabilities* or *learning styles* because, typically, there was a limited discussion of intelligence related to these topics, or they were not included in the main chapters related to intelligence. Likewise, we only coded Piaget's theories if the authors explicitly presented them in relation to intelligence. We did not code photos included in the texts or count them as part of the page length. We

included tables and figures related to the coded topics as part of the page length.

For us to code a text passage as a classroom application of intelligence, the textbook authors had to explicitly state what teachers could do in the classroom based on that particular intelligence topic. We coded other discussions of an intelligence topic not related to use or application as theory. We did not code case studies, scenarios, and self-assessments for chapters related to intelligence. We excluded these items to make the analysis more equitable. Some texts had supplemental case study texts which were marketed with them; therefore, those texts did not include case studies or scenarios. We did not code self-assessments either because each text handled its assessments differently (e.g., at the end of a chapter, in sidebars).

To evaluate the amount of emphasis given to each intelligence topic and application, we measured page coverage with a ruler to the nearest quarter of a page. Wininger and Norman (2005) followed a similar measurement protocol in their study of how formative assessment was presented in educational psychology textbooks. We decided to follow Wininger and Norman's format because it provided a logical and clear way to analyze the coverage amount that each textbook devoted to covering intelligence topics.

Results

Explicit Definitions of Intelligence

All the authors who explicitly defined intelligence included the fact that intelligence is adaptive behavior, involves solving problems (or the ability to accomplish challenging new tasks), or both (see Table 2). Some authors also included the ability to acquire knowledge (Eggen & Kauchak, 2007; Woolfolk, 2008) or to think and reason in the abstract (Eggen & Kauchak, 2007; Slavin 2006). Five of the authors did not provide a single, explicit definition of intelligence in their textbooks.

Eight of the textbooks included intelligence as a main subject in a chapter about individual differences (see Table 2). The other three textbooks grouped intelligence in chapters with problem solving (Alexander, 2006), exceptionality (Fetsco & McClure, 2005), or creativity (Jordan & Porath, 2006).

Topics Related to Intelligence and Classroom Applications

Our text analysis revealed 19 topics presented in these texts. The complete list of the topics is presented in Table 3 in order of frequency and a brief description of these theories is provided in the Appendix. Authors devoted the most text length to the following topics: (a) attribution theory; (b) IQ testing, measuring intelligence, and the history of intelligence; (c) Gardner's theory of multiple intelligences; (d) Sternberg's triarchic theory of successful intelligence; (e) comparisons of heredity vs. environmental influences on intelligence; and (f) incremental and entity views of intelligence. For all 19 topics, the amount of pages devoted to classroom application was less than the amount devoted to explaining the topic itself (see Table 3). In general, the more text that was included for topics, the more text that the authors included for classroom applications. Of all the topics covered, attribution theory (an average of 1.0 page) and Gardner's multiple intelligences theory (an average of 0.72 page) had the most classroom-application page coverage.

Table 2. *Definitions of Intelligence and Main Chapter in Which Intelligence is Covered*

Authors	Definition	Main chapter covering intelligence
Alexander	No single explicit definition	Chapter 8: Profiling Problem Solving in the Classroom
Eggen & Kauchak	"The ability to acquire knowledge, the capacity to think and reason in the abstract, and the ability to solve novel problems." (p. 96)	Chapter 4: Group and Individual Differences
Fetsco & McClure	No single explicit definition	Chapter 11: Intelligence and Exceptionality
Jordan & Porath	No single explicit definition	Chapter 8: Understanding Our Learners: Intelligence and Creativity
O'Donnell, Reeve, & Smith	No single explicit definition	Chapter 4: Individual Differences Among Learners
Ormrod	"Ability to apply prior knowledge and experiences flexibly to accomplish challenging new tasks." (p. 149)	Chapter 5: Individual Differences and Special Educational Needs
Santrock	"Problem-solving skills and the ability to adapt to and learn from life's everyday experiences." (p. 115)	Chapter 4: Individual Variations
Slavin	"General aptitude for learning, often measured by the ability to deal with abstractions and to solve problems." (p. 121)	Chapter 4: Student Diversity
Snowman & Biehler	No single explicit definition	Chapter 4: Understanding Student Differences
Sternberg & Williams	"We define intelligence here as goal-directed, adaptive behavior." (p. 122) [a]	Chapter 4: Individual Differences
Woolfolk	"Ability or abilities to acquire and use knowledge for solving problems and adapting to the world." (p. 123)	Cluster 4: Learner Differences and Learning Needs

[a] This book does not define terms in the margins.

Table 3. *Page Coverage of Intelligence Topics*

	Alexander		Eggen & Kauchak		Fetsco & McClure		Jordan & Porath		O'Donnell, Reeve, & Smith		Ormrod		Santrock		Slavin		Snowman & Biehler		Sternberg & Williams		Woolfolk		Average coverage for topic and app	
Topics	**Top**	**App**	**Top**	**App**	**Top**	**App**	**Top**	**App**	**Top**	**App**	**Top**	**App**	**Top**	**App**	**Top**	**App**	**Top**	**App**	**Top**	**App**	**Top**	**App**	**Top**	**App**
Attribution Theory [a]	2.50	2	2.50	.75	5	.50	2		2.50	1.25	8.50	3.75		.25	3.50	1	1.25	.50	.75		4.50	1	3	1
IQ Testing, Measurement, History	.50		2.25		1.75	.50	4.75		6		1.75	2.50	4.50	.75	2.50		2	.25	4.50		1.75	.50	2.93	.40
Gardner's Multiple Intelligences	1		1.25	.50	2	1.75	1.75	.50	1.25		1.75		1	2.25	.75	.75	2	1	1.50	.50	1.50	.75	1.43	.72
Sternberg's Triarchic Thy	2.50		.50	.50	1.50	1	.75		1		1.50		1.25				2.75	1.75	2	1.25	1		1.34	.40
Heredity vs. Environment			.50						5.50		1.25		2		.75				2	2	1		1.18	.18
Entity/ Incremental Views	.25		.50		2		2.25	.25	2.75		.50	.50				.75	1.75	.50	1.50	1	.75		1.11	.27
General Discussion [a]	.25		.75		.50		.50		.75		1		1.50		.75		.25		2	.25	.75		.81	.02
Mental Retardation [a]									.50		1				.75		1.75		2.75		1		.70	0
Giftedness [a]									.50		1	1.25			1	.75	1		1.50		1	.50	.504	.22
Spearman/Gen. Intelligence (g)	.50		.25		.25				.25		.50		.75		.50		.25		.25		.25		.34	0
Emotional Intelligence			.75										.50								.75	.25	.20	.02
Hierarchical Model—Carroll					.25								.25						.50		1		.18	0
Thurstone & Guilford	.50				.25				.50				.25						.50				.18	0
Cattell &Horn	.50								.25		.50								.25		.25		.15	0
Wechsler													1				.50						.13	0
Cultural Consid [a]							.50								1								.13	0
Distributed Intelligence											1												.09	0
Speed of Processing																			1	.50			.09	.04
Piaget [a]					.50																		.04	0

Notes. A brief description of each of the topics is provided in the Appendix. Page numbers were rounded to the nearest quarter of a page. App = classroom application. [a] Only coded if intelligence was specifically mentioned in the discussion.

Limitations

The results of this study must be viewed within the context of the limitations. First, the current study examined only 11 textbooks. Other textbooks, which may not be as popular as the selected texts, may vary in their coverage of intelligence theories. Second, because we used indexes to identify pages with relevant content, some pages related to intelligence may have been missed if not indexed properly. Third, the organization and style of the textbooks were probably affected by the fact that most of the textbooks were produced by the same publisher (Pearson).

Discussion and Implications for Textbook Authors

Research Question 1: Intelligence Defined—Malleable or Fixed?

Our first research question was "How is intelligence defined—as a malleable or fixed entity—in introductory educational psychology textbooks?" The explicit definitions of intelligence provided in the textbooks appear to be consistent with contemporary theories of intelligence (Sternberg, 2003, 2004a, 2004b). For example, the explicit definitions included one's ability to adapt to his or her environment and/or to solve problems, which is consistent with Sternberg's triarchic theory of successful intelligence. Moreover, many of the classical conceptions of intelligence are presented, such as those of Spearman, Thurstone, Guildford, and those related to IQ testing and measurement. Although we acknowledge the difficulty in defining intelligence, we would suggest that the five textbook authors who did not provide a specific definition, provide one, even if it is a broad one. Or, simply acknowledge that intelligence cannot be defined. For example Sternberg (2003) wrote, "There is no consensus as to what intelligence is or how to measure it" (p. 38). Without such an acknowledgement, students are likely left wondering how intelligence is defined.

The number of topics listed in Table 3 that were included in any one text ranged from 7 to 14, with an average of 10.50 topics included in each text. The intelligence topics presented in the texts were fairly consistent with current theories of intelligence (Sternberg, 2003). However, we believe that some texts did not provide any or enough coverage of some important topics that have significant implications for the malleability of intelligence. Fluid and crystallized ability models (Cattell, 1971; Horn, 1994) suggest that intelligence has components that may be more fixed (fluid) and some that are more malleable (crystallized). Yet the theory of fluid and crystallized ability was covered in only five of the texts and did not receive more than a half of a page of coverage in any of the texts. Some current hierarchical intelligence theories that have been influential in the field were also absent or given little coverage. For example, Carroll's (1993) hierarchical model of intelligence was included in only four texts. Further, biological theories of intelligence received little to no coverage in any of the texts. These theories include those that consider the speed of neuronal conduction (Vernon & Mori, 1992), glucose metabolism (Haier et al., 1988), brain size (Willerman, Schultz, Rutledge, & Bigler, 1991), and behavior genetics (see Sternberg & Grigorenko, 1997, for a review). Some of the ideas in the biological theories may be present in other topics included in the texts (such as *Speed of Processing* and *Spearman/General Intelligence* [g]), but they are not explicitly discussed in the texts. Textbook authors might consider including these types of intelligence theories because they might have an impact on students' beliefs about the malleability of intelligence.

In considering the amount of text devoted to each of the theories, it is important to consider how we coded the two theories with the greatest page length: (a) attribution theory and (b) IQ testing, measurement, and history. First, as discussed previously, we coded the entire section related to attribution theory because it was difficult to single out the parts of the section that pertained to beliefs about the malleability of intelligence (i.e., effort attributions). As a result, some of these pages include information that is not directly related to theories of intelligence, only indirectly related by their association with attribution theory. It is also noteworthy that Ormrod's (2008) text devotes significantly more pages to attribution theory than the other authors, which inflated the overall total average. Second, we coded ideas related to IQ testing, measurement, and history together because the authors generally presented these ideas together and we found it difficult to separate them given their overlap. Because of this, it is not surprising that the code for IQ testing, measurement, and history is the second largest given the range of ideas included in it.

In addition to attribution theory and IQ testing, measurement, and history, Gardner's multiple intelligence theory and Sternberg's triarchic theory had significant page coverage. In regards to theory coverage, Gardner's and Sternberg's theories were almost equal when summed across all 11 textbooks: Gardner's theory had an average of 1.43 pages and Sternberg's theory had 1.34 pages. Gardner's theory had slightly more application coverage than Sternberg's theory (0.72 pages vs. 0.40 pages), which is not unexpected given that Gardner's theory is very popular with classroom teachers and the general public (Cuban, 2004).

Whether or not the texts presented intelligence as a malleable, as opposed to a fixed, entity, was difficult to answer. We did not have a direct measure of whether a theory portrayed intelligence as malleable or fixed. Therefore, the discussion in this section is primarily based on our interpretation of the data and our own beliefs. Nonetheless, it is an important question to attempt to answer because of the importance of these beliefs on students' motivation and achievement (Blackwell et al., 2007; Dweck, 1999).

The authors' explicit definitions of intelligence do not address whether intelligence is malleable or fixed. For example, knowing that intelligence is an adaptive behavior that involves solving problems could be interpreted as something that is changeable (e.g., "I can improve my ability to solve mathematical problems") or fixed (e.g., "Some people are born with a greater ability or aptitude to solve mathematical problems"). Therefore, we speculate that the explicit definitions do little to affect students' beliefs about the malleability of intelligence.

A subtler message that texts send to readers may be in the title of the chapter in which the theories of intelligence appear. Almost all the authors structured their textbooks to include intelligence as part of a chapter about individual differences. We wondered whether labeling these chapters as "Individual Differences" might portray intelligence as more fixed than malleable. Although someone with a malleable view of intelligence would state that students differ in their intelligence, the assumption for readers who see intelligence included in a chapter on *differences* might conclude that intelligence is fixed. In contrast, a reader who finds information about intelligence in a chapter titled "Problem Solving" might view an intelligent person as someone who is a better problem solver. If the readers believe that individuals can increase their problem-solving skills through obtaining more knowledge and strategies via effort,

they might believe that intelligence too can be increased through effort. Furthermore, preservice teachers reading about intelligence in the "Individual Differences" chapter might believe that they will have students with high, average, and low intelligence and may believe they should learn to identify (or label) these students quickly to better meet their needs. This labeling applies not only for individual students, but also to groups of students (based on gender, race, ethnicity, etc.) when intelligence is considered a group difference (Oakes et al., 1997). Teachers prejudging students' intelligence and abilities because of their conception of intelligence may lead to negative consequences for students believed to have less intelligence (Banks & Banks, 1995; McLoyd, 1998). Whether the chapter titles suggest a fixed view of intelligence is purely speculation on our part, but given the importance of beliefs about intelligence, we believe that a separate chapter, titled appropriately, would be warranted.

In determining how a text might affect a reader's beliefs about the malleability of intelligence, it is important to consider the amount of text included for topics that explicitly address the malleability of intelligence. Three of the 19 topics listed in Table 3 addressed the malleability of intelligence fairly explicitly and usually included a discussion of the benefits of having a malleable view, including: (a) attribution theory, (b) theories related to heredity and environment, and (c) entity and incremental views of intelligence. We found it encouraging that these three theories all had page counts in the top six of the 19 theories included in Table 3, suggesting that the authors believed that these theories were important. However, these three theories were never included in the same chapter, which might make it difficult for students to connect these ideas together. Attribution theory was not included in the intelligence chapter for any of the 11 texts and, instead, was included in a chapter on student beliefs or motivation. For the six texts that included a discussion of theories related to heredity and environment, all of these texts included this information within the main chapter on intelligence. Of the 10 texts that included ideas related to entity and incremental views of intelligence, all of them included these ideas in a chapter related to student beliefs or motivation; and three texts included these ideas in the intelligence chapter. Sternberg and Williams's (2002) text also included incremental/entity views of intelligence in a third chapter titled "Becoming an Expert Teacher; Becoming an Expert Student." It is reasonable to expect that large topics such as intelligence and motivation would have to be divided into separate chapters; however, we believe that the authors could make more explicit connections between some of the overlapping ideas.

The Sternberg and Williams (2002) text was one of the most explicit with respect to how the malleability of intelligence was portrayed. They presented the idea of malleable intelligence in the first chapter—in a section titled "Incremental View of Intelligence"—and stated, "Research has shown that intelligence can be increased" (p. 24). They continued with this theme in Chapter 4 (titled "Individual Differences") by writing, "Expert teachers know that people are malleable in their abilities" (p. 138). And they gave advice as to how to promote incremental views in students in Chapter 10 (titled "Motivating Students") by noting, "Expert teachers can help students develop an incremental view of their abilities and an 'effort attitude' by stressing that improvement comes from effort and that everyone has the ability to improve through hard work" (p. 370). A strength of this method of presentation is that readers are exposed to the malleability

of intelligence in the first chapter and the idea is built upon in subsequent chapters (as opposed to simply presenting these ideas in two disparate chapters). We do not know the best means to connect these ideas for students in texts, but we hope that by raising this issue, more introductory educational psychology authors will be cognizant of it and attempt to find some novel ways to improve upon it.

Research Question 2: Classroom Applications

Our second research question was "To what extent are classroom applications of intelligence topics included in the textbooks?" We documented that the amount of pages devoted to classroom applications was much less than the number of pages devoted to intelligence topics. Considering the total number of pages devoted to intelligence topics and application, only 18.50% of the coverage was devoted to the classroom application of intelligence topics. This may be due in part to the fact that less research has been conducted in the application of these theories. Or, it might be typical of the approach used in these types of textbooks in which more space is devoted to content and theory than to classroom application. Nonetheless, based on our experience as instructors of introductory educational psychology courses, we speculate that the lack of practical applications may lead readers to have a limited or incorrect understanding of how these topics and theories connect to practice. One implication of the lack of classroom applications is that textbook authors might need to include more classroom applications within the text to help students better connect theory to practice.

Implications for Educational Psychology Instructors

Given the multitude of intelligence theories, instructors need to help students make sense of the concept of intelligence so that they are not left wondering, "Which view of intelligence is correct?" In fact, five of the textbooks did not provide an overall definition of intelligence, which could add to students' confusion. By defining intelligence, instructors can provide students with a broader view of intelligence than simply an IQ score. Doing so could be important considering that teachers' views of intelligence can be limited to things such as IQ tests (Pretzlik et al., 2003). Because all textbooks do not provide the same amount of coverage, instructors need to carefully assess the intelligence topics in the textbook they use and determine whether additional resources would be useful to students in understanding intelligence. Additional readings might be useful, but instructors may also consider resources such as websites and videos that include information that is not available in the textbook.

Ideas related to the malleability of intelligence are often presented in different chapters, such as the intelligence chapter and the motivation chapter. To help students connect the ideas in one chapter to the ideas in another, instructors may consider reorganizing text readings and instruction to present overlapping ideas in a way that makes a stronger connection among them. A simple, but maybe less effective, way to accomplish this is to specifically refer to other chapters in which the same ideas have been presented (e.g., "In Chapter 10 we discussed…"). A better way might be to show students concept maps with the intelligence concepts connected. Another alternative is to have students create concept maps with these concepts, either by themselves or in groups.

Because the textbooks generally do not contain as many classroom applications as explanations of intelligence topics and theories, instructors should consider supplementing the texts with materials or activities that provide classroom applications. Some of the texts included case studies or scenarios related to intelligence theories (which we did not include in our

text analysis), whereas others have supplemental texts which supply case studies for classroom use. Case studies might be one way to help students better understand how implications of intelligence topics and theories can be applied to their own classroom.

We noted previously that labeling the intelligence chapters as "Individual Differences" or a similar title might portray intelligence as more fixed than malleable. We would also encourage instructors to examine how they portray intelligence in their syllabus, websites, class presentations, activities, and assignments. It might be useful to have a class or online discussion about the title of the intelligence chapter to ask students why they believe that the author chose that title and whether or not it was appropriate.

In regards to helping preservice teachers learn how to teach, it is best to examine the beliefs they hold when they enter the program and then to challenge those beliefs (Wideen, Mayer-Smith, & Moon, 1998). In terms of how preservice teachers view intelligence, it may be worthwhile to measure students' beliefs about intelligence when they enter into a teacher-education program. Some of these beliefs can then be challenged in an introductory educational psychology course through the use of explanations, discussions, case studies, scenarios, and role- playing.

To force students to think about and make explicit their beliefs about intelligence (as suggested by Watanabe, 2006), the second author of this paper asks students in his educational psychology courses to complete a questionnaire on the first day of the course and near the end of the course (Jones, Bryant, Snyder, & Malone, 2011). The first-day questionnaire is administered in class and includes two primary measures: (a) an open-ended item (similar to the "definition of intelligence" item presented in Jones, Byrd, & Lusk, 2009) that asks students to list characteristics that make one student more intelligent than another, and (b) the *Theories of Intelligence Scale–Self Form for Adults* (Dweck, 1999) that can be used to classify students as having either a malleable or fixed view of intelligence (a sample item is "You have a certain amount of intelligence, and you really can't do much to change it"). Next, the instructor collects and saves these questionnaires until the time in the course when the topic of intelligence is covered. The instructor then presents a summary of students' views and has students discuss the findings and compare them to the research presented in the course readings. Alternatively, the instructor could return the questionnaires and have students discuss their views with other students. Near the end of the course, students complete another questionnaire that asks them whether or not their views of intelligence have changed as a result of participating in the course and to explain their answer. This activity requires students to contrast the researchers' definitions to their own beliefs. These types of activities allow students to reflect on their beliefs and force them to reconcile differences between the "textbook definitions" and their own beliefs.

As some researchers have documented (e.g., Georgiou, 2008), most novice teachers do believe that effort plays a large part in student achievement, and as instructors, we should not assume that all preservice teachers hold the same viewpoint. Furthermore, we should ask why these future teachers hold these beliefs. By understanding why our students hold the beliefs they do, we can begin to gain greater insight into how they view teaching and learning as a process. We should challenge students to ensure that they also view their own effort in the classroom as important as their students' effort. The use of refutational texts instead of standard expository texts may be one way to do this. Although we did not examine the introductory textbooks' effects on preservice teachers' beliefs about

intelligence, this topic should certainly be examined.

Finally, field experiences related to educational psychology courses may provide a unique opportunity for students to apply the theories and concepts they are learning in the course. Service-learning experiences have been shown to have a wide variety of positive teacher how he or she defines intelligence or identifies "intelligent" students. As some researchers have indicated, experienced teachers tend to hold more of a fixed view of intelligence. It would be interesting to know whether their views of intelligence changed over their years as teachers. In other words, did they always believe intelligence to be fixed or have years of teaching changed their beliefs?

Future Directions

Researchers could further the findings of the present study by analyzing what preservice teachers learn from each text. One way to assess what students learn from texts would be to evaluate their viewpoints related to intelligence at the beginning of the course and again at the end to examine how the texts changed their views. Doing so would allow researchers to answer questions such as: "How have students' definitions of intelligence changed after reading the textbook?" "Do they have a more malleable or fixed view of intelligence?" and "Are certain texts more effective than others in changing students' viewpoints, or do the texts have no effect at all?" A second area for researchers to examine is how supplemental materials, such as case studies, videos, and websites, affect students' beliefs about intelligence. Further research into the effects of texts and supplemental materials on students' beliefs about intelligence could help preservice teacher educators provide the best possible instruction to prepare future teachers for the challenges they will face.

outcomes for students in educational psychology courses, including transforming their perspectives on different issues (Malone, Jones, & Stallings, 2002). In relation to intelligence, it may also be worthwhile to have preservice teachers discuss with a mentor

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Appendix A. *Brief synopsis of topics listed in Table 3*

This summary is not meant to be comprehensive or to imply that all of the authors explained these topics similarly. Rather it is meant to provide a basic understanding of the typical manner in which the authors explained the topics listed in Table 3.

1. Attribution theory is related to how one forms causal explanations for a particular event or characteristic, such as intelligence (Weiner, 2000). Learners' attributions influence other factors, such as expectations, effort, and persistence.
2. IQ testing, measurement, and theory describe how IQ, as a concept, was developed and by whom (e.g., Binet & Simon, 1916). It details how IQ is measured and how intelligence tests are conducted.
3. Gardner's theory of multiple intelligences proposes that individuals have at least eight, possibly more, distinctive intelligences (Gardner, 1983, 1999). These different intelligences—linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, interpersonal, intrapersonal, and naturalist—are independent of each other.
4. Sternberg suggests in his triarchic theory of intelligence that people are intelligent in three areas: (a) analytical intelligence, (b) creative intelligence, and (c) practical intelligence (Sternberg, 1985). Intelligent behavior, he proposes, is based on three factors: (a) environmental context, (b) prior experiences, and (c) cognitive processes.
5. Heredity vs. environment entails the discussion about what has more influence on intelligence: one's genetics (nature) or the environment in which one was raised (nurture).
6. Entity/incremental views encompass discussion about whether or not intelligence can be altered. It examines whether intelligence is fixed from birth (an entity view) or can be changed over time (an incremental view; Dweck & Leggett, 1988).
7. General discussion of intelligence includes text devoted to discussing intelligence that did not fit into any of the categories devoted to theories of intelligence.
8. Mental retardation and giftedness incorporate sections of text focusing on these labels and how intelligence ties into the two. Items were not coded if intelligence was not discussed in relation to mental retardation or giftedness.
9. Giftedness is included in the description of number 8 above.
10. Spearman's *g* describes Charles Spearman's early 20th century theory that intelligence is composed of a general ability to reason, as well as specific, narrowed abilities to execute tasks (Spearman, 1927).
11. Emotional intelligence is defined as the ability to identify and handle one's emotions and the emotions of others (e.g., Salovy & Mayer, 1990).
12. Carroll's hierarchical model presents intelligence as a complex concept which has three strata (Carroll, 1993). The top stratum is general intelligence, below which is a group of broad mental abilities that includes fluid and crystallized intelligence to varying degrees. At the bottom stratum is a group of very specific mental abilities (e.g., reading, speed).
13. Thurstone (1938), taking a factor-analytic approach, believed intelligence is composed of seven primary mental abilities (e.g., verbal comprehension, spatial visualization). Guilford (1967) expanded upon Thurstone's work with his structure of

intellect theory, which describes intelligence as a composition of three independent dimensions: contents, operations, and products.

14. Cattell (1971) and Horn (1968) focused on fluid and crystallized intelligence. Fluid intelligence is the ability to quickly acquire knowledge and effectively adapt to new situations. Crystallized intelligence is an accumulation of knowledge and skills from prior experiences, as well as school and culture.
15. Wechsler defined intelligence as the global capacity of a person to act purposefully, think rationally, and deal effectively with the environment (Wechsler, 1975). He is well-known for his intelligence tests, including the Wechsler Adult Intelligence Scale (WAIS; Wechsler, 1997) and the Wechsler Intelligence Scale for Children (WISC; Wechsler, 2003).
16. Cultural considerations include discussions of intelligence in relation to one's culture or how culture can influence intelligence and how it is portrayed.
17. Distributed intelligence includes thinking that involves assistance from one's physical, cultural, or social environment (e.g., Sternberg & Wagner, 1994).
18. Speed of processing refers to the idea that the faster one can process information, the more information he or she may learn (e.g., Jensen, 1982). Therefore, someone who processes information quickly may be more intelligent than someone who processes information slowly.
19. Piaget's theory of intelligence focused on how people could use adaptation and assimilation to refine their schemes (Piaget, 1950). When a person takes in new information, the data must be modified to fit into existing schemas, or new schemas must be formed to accommodate it.