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Exploring the Prevalence of Learning Styles in Educational Psychology and Introduction to Education Textbooks: A Content Analysis

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EXPLORING THE PREVALENCE OF LEARNING STYLES IN EDUCATIONAL
PSYCHOLOGY AND INTRODUCTION TO EDUCATION TEXTBOOKS:
A CONTENT ANALYSIS

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EXPLORING THE PREVALENCE OF LEARNING STYLES IN EDUCATIONAL PSYCHOLOGY AND INTRODUCTION TO EDUCATION TEXTBOOKS: A CONTENT ANALYSIS

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The implementation of learning styles models in the classroom remains a heavily debated topic in education. Notable problems with utilization of learning styles in the classroom include a lack of empirical research support and potential maladaptive effects on student learning and motivation. The primary research questions focused on the presence and quantity of learning styles discussion in the text, which definitions, models, and recommendations were presented, and which of the cited references were based on empirical data. The answers to these questions were compared between educational psychology and introduction to education textbooks. A content analysis of introduction to education (n = 10) and educational psychology (n = 10) textbooks was conducted. Eighty percent of the textbooks included a discussion of learning styles. Half of the textbooks defined learning style as a preference or approach and the other half as an individual process or style. One-fourth of the textbooks recommended matching instructional methods to learning styles. One comparison of text types, the number of empirical references cited in the text, was statistically significant. Given that most textbooks do not recommend matching instructional methods to learning styles, future research should examine the source of teachers' beliefs that student learning is improved with the matching of learning styles to teaching approach.

Introduction

      Although there is an absence of empirical support for the benefit of learning styles on student success, learning styles have remained a prevalent component of teaching in many classrooms. This study examined the coverage of learning styles theories in teacher training programs through popular educational psychology and introduction to education textbooks. These courses often provide the foundation for future teachers' understanding of student learning and their formal framework for understanding learning styles, specifically. This content analysis examined how textbooks define learning styles, which models of learning styles are presented, and whether the implementation of learning styles is recommended. Prior to discussion of the content analysis, a literature review provides a brief overview of popular learning styles models and common practices for their implementation, as well as a discussion of empirical literature examining interventions with learning styles. Given the prevalence of the implementation of learning styles in the classroom and the lack of research supporting its positive impact on student success, the potential ways learning styles could be maladaptive to student learning are also addressed.

Literature Review

      A long history of debate exists regarding the prevalence of learning styles in education. The term "learning styles" generally refers to the idea that different students learn more effectively when information is presented in specific ways; however, many definitions of this concept exist, leading to a great deal of conceptual confusion (Pashler, McDaniel, Rohrer, & Bjork, 2009). The origin of learning styles theories can be traced back to a variety of different theories for grouping or classifying personality types. The

earliest of these tests is the Myers-Briggs Type Indicator test, which gained popularity in the 1940s (Paschler et al., 2009). In the 1960s, researchers hypothesized about aptitude-treatment interactions, but by the 1970s empirical research had in large part indicated that the interactions between students' preferences and teachers' instructional approaches did not lead to increased learning (Scott, 2010). Fridley and Fridley (2010) indicated the appeal of learning styles could be related to Gardner's theory of multiple intelligences.

Just as there are multiple potential origins for the learning styles theory, there are many conceptualizations of learning styles models. In one review of learning styles, 71 different models of learning styles were identified (Coffield, Moseley, Hall, & Ecclestone, 2004). Scott (2010) described several of the most widely researched theories, including Kolb's (1984) four-way typology of learners as convergers, divergers, assimilators, and accommodators; Gregorc's (1982) four-way typology of concrete-sequential, abstract-random, abstract-sequential, and concrete-random learners; and the Felder and Silverman (1988) four-dimension model. Dunn and Dunn's (1992) model and instruments of learning styles have also been extensively studied. According to this model, there are five stimuli strands: environmental, emotional, sociological, psychological, and physiological (Dunn & Dunn, 1992). According to this model, a student's learning style is comprised of the exact combination of identified preferences within each of those strands.

Despite the prevalence of the aforementioned learning styles models, the most popular models utilized in education are those stemming from the VARK model, which consists of the following four perceptual modalities: Visual, Auditory, Read/Write, and Kinesthetic learning (Fleming & Mills, 1992). The VAK model, a version of this theory

commonly adopted by educators, includes only the visual, auditory, and tactile/kinesthetic groups (Scott, 2010).

Implementation of Learning Styles

The implementation of learning styles in the classroom is supported by a wide variety of easily accessible commercial products and educational literature (Cuevas, 2015). Although there are a vast number of recommended practices within the realm of learning styles, the most common is the meshing or matching hypothesis (Pashler et al., 2009). Educators adhering to this model assess students to determine their learning styles through one of several self-report measures. The educator is then expected to provide instruction to students in the ways that best match their individual styles. For example, people subscribing to this school of thought believe that a learner determined to have a visual learning style should be presented information in a primarily visual format (Pashler et al., 2009).

Learning Styles Instruments

Most learning styles instruments are forced-choice, self-report questionnaires utilized to categorize students into one of several styles (Dembo & Howard, 2007). Learning styles inventories have been criticized for having weaknesses such as low reliability, poor validity, and little pedagogical impact (Coffield et al., 2004). For example, Dunn and Dunn (1992) have produced several self-report inventories based on their learning styles model, and the number of factors presented and the subsequent test-retest reliabilities vary between versions of those inventories. One of Dunn and Dunn's inventories, the Productivity Environmental Preference Survey Learning Style Inventory (LSI), yielded test-retest reliabilities greater than .60 for 90% of factors. The manual for

the LSI, another inventory based on Dunn and Dunn's model, indicates that the test-retest reliabilities for 21 of the 22 factors on the 1996 revised LSI were greater than .60. The overall internal consistency is estimated to be .60 or higher, but the internal consistencies of the factors range from .55 to .88 (Coffield et al., 2004). Supporters of the Dunn and Dunn inventories claim construct and predictive validity are high, but validity data are not provided in the manual.

Fleming's (2001) VARK assessment is a sixteen-item questionnaire available for online administration. Each question consists of four response options, each associated with one of the four modalities (Leite, Svinicki, & Shi, 2010). Although the VARK questionnaire is widely used by educators, minimal research has been conducted to establish the validity or reliability of its scores. Leite et al. (2010) analyzed the data of 14,211 participants who took the VARK online assessment in 2007 and obtained adequate internal consistency reliability estimates for the visual, aural, read/write, and kinesthetic subscales, with scores of .85, .82, .84, and .77, respectively. The authors noted that determining the VARK assessment's validity as a research tool would require evidence of its testing, content, and response process consequences (Leite et al., 2010).

As with other aspects of learning styles, the empirical evidence supporting learning styles inventories is sparse. Despite the popularity of inventories such as the VARK, few studies have been conducted to establish their validity and reliability. The authors of these popular learning styles inventories claim to have data supporting the validity and reliability of their measures; however, the data provided in their manuals only weakly support the use of these instruments as a way to identify student learning preferences.

Empirical Research Data

Empirical research regarding the implementation of learning styles was reviewed. Pashler et al. (2009) described the type of empirical evidence necessary to test the meshing hypothesis. To support the meshing hypothesis, these studies must show that when students receive instruction matched to their learning styles, student learning is improved. A wealth of literature regarding the implementation of learning styles exists. However, there are few studies available that are structured in a way that shows this interaction. Out of approximately 1,400 articles referencing learning styles published between 2009 and 2015, only 31 were determined to be empirical studies relating to the interaction between learning style and instructional method (Cuevas, 2015).

Cuevas (2015) identified two experimental studies that utilized the VAK or VARK models in search of interaction effects. In one experimental study, Mahdjoubi and Akplotsyi (2012) administered a 39-item assessment to elementary students to determine whether they were visual, auditory, or kinesthetic learners. The assessment was based on Fleming's (1992) VAK learning style instrument and modified by the researchers to include child-friendly language. The students participated in three tasks: one visual, one auditory, and one kinesthetic. Significant interaction effects were found between students' identification as V, A, or K, and their level of active involvement in the corresponding condition. Although the research suggested that VAK styles could have an influence on learning behaviors, the matching hypothesis could not be supported because learning was not measured. In another study, Sankey, Birch, and Gardner (2011) assigned 60 students to six experimental learning conditions using the VARK assessment. Each group of 10 students consisted of two visual, two aural, two read/write, two kinesthetic,

and two multimodal learners. An interaction effect was not supported by the experimental data. Students did not learn more when assigned to their preferred learning style. However, qualitative data revealed participants found multimodal learning resources were most helpful.

It is important to note the deficit of VAK or VARK studies available. Although variations of the VAK or VARK models continue to be the most commonly accepted form of learning styles in education, they are also the least prominent in published research. Despite the advocacy for and popularity of these models in the classroom, there is an absence of empirical support for their benefit on student learning, specifically with regard to the matching of instruction to learning styles.

The Potential Negative Impacts of Using Learning Styles in the Classroom

Incorporating the identification of learning styles into the classroom could be maladaptive to student success for several reasons. The first reason involves the impact on students' encoding of information. The process of placing information into long-term memory is called encoding, and the way students encode information impacts how well they remember it (Bruning, Schraw, & Norby, 2011). Two of the primary areas of research regarding student encoding are multiple modalities and dual-coding theory.

Multiple modalities refer to the sensory system, typically auditory or visual, a student uses to receive information (Moreno & Mayer, 2007). Information can be held in the auditory register for approximately three seconds and in the visual register for less than half a second (Bruning et al., 2011). Capturing and maintaining student attention is crucial to students' abilities to perceive and decode information. Given the brief amount of time students are able to hold information, it is more likely that students will attend to

information if it is presented in both visual and auditory formats as opposed to only one format. For example, rather than presenting information in a solely auditory format, student attention might be better maintained if the auditory information is paired with visual aids.

Dual-coding theory is an explanation of the mental processes humans utilize in learning and understanding experiences. According to the dual coding theory, verbal information and nonverbal information are represented differently in their corresponding systems. Information is more effectively encoded when it is presented in a way that both mechanisms are activated and an association is made between the nonverbal and verbal systems (Clark & Paivio, 1991). Dual-coding research indicates students benefit from the addition of imagery to verbal information when compared to verbal information alone (Clark & Paivio, 1991). That is, students learn most effectively when verbal and non-verbal representations of information are presented through mixed modalities. Therefore, a student's encoding may be most effective when he or she is presented verbal materials in the auditory modality and nonverbal materials in the visual modality (Moreno & Mayer, 2007). Research on dual-coding contradicts the matching hypothesis associated with learning styles where a single modality is recommended. For example, qualitative data in the aforementioned study conducted by Sankey et al. (2011) indicated participants found multimodal learning resources to be the most helpful.

The identification of a students' learning styles may also negatively impact their motivation. A student's motivation is derived from one's beliefs about learning (Zimmerman, 2002). These beliefs include how students interpret causes of success and failure and how they perceive their capabilities to learn. Attribution theory is the study of

individuals' perceived cause of a particular outcome and their subsequent motivation (Weiner, 1972). Ability and effort are two of the most common attributions for academic performance. Attributing success or failure to effort is more useful because it implies that when more effort is exerted, better outcomes will be produced in the future (Stipek, 1998). In accordance with attribution theory, students who attribute failure to being taught in a way that did not match their learning style would believe their achievement outcome was directly impacted by the teacher's presentation style. Therefore, the outcome is attributed to an external factor that is outside of students' control. The students may then anticipate failure on future tasks that involve information presented in a way that is contradictory to their learning style. Students' causal attributions may impact their effort and persistence on future tasks, directly impacting their learning in the classroom (Weiner, 1972). Attributing poor performance to a mismatch in learning style and teaching modality would be maladaptive from a motivation perspective.

Student self-efficacy is the belief that one has the abilities necessary to demonstrate desired academic outcomes (Margolis & McCabe, 2006). When students have low-self efficacy, or believe they cannot succeed on a given task, it is likely they will not put forth the effort required to do well on that task. When students attribute their failure to not being taught in their preferred learning style, it impacts their self-efficacy. They believe they were unable to perform well on a task due to the way information was presented; therefore, their self-efficacy for tasks presented in a similar way in the future will be low. The attribution of their failure to not being taught in their preferred learning style reinforces their belief that they cannot succeed on those types of tasks in the future. Consequently, they are likely to put forth less effort on future tasks or not attempt them at

all. Research indicates that students who blame failure on uncontrollable factors, in this case learning styles, develop learned helplessness and in turn give up easily when facing difficult tasks (Stipek, 1998).

In summary, the implementation of learning styles models in the classroom has continued to remain a widely accepted practice by teachers. Howard-Jones' (2014) review of studies of teachers in five countries indicated that 93% to 97% of teachers believed people learn best when information is presented in their preferred learning style. Similarly, when 313 participants were asked to rate their agreement with a statement indicating people learn in distinctly different ways and some learn best visually, others auditorally, and other kinesthetically, the mean rating was 6.35 on a 7-point Likert-type scale (Willingham, 2015). From the literature, the most popular model used in education is the VAK (Visual, Auditory, Kinesthetic) model (Scott, 2010). The most common practice is the meshing or matching hypothesis, which encourages teachers to identify a student's learning style through a self-report measure and teach that student using methods that match his or her style (Pashler et al., 2009). A review of literature reveals three key problems with this practice. The first is that on even the most popular learning styles inventories, such as the VARK assessment, minimal research has been conducted to establish the validity or reliability of its scores (Leite et al., 2010). The second is that few empirical studies have been designed in such a way that demonstrates that when students' instruction is matched with their learning styles, their learning is improved. Of the studies designed in this way, an interaction effect could not be supported by experimental data, i.e., demonstrating no effect on learning outcomes. The third key problem is that the use of learning styles in the classroom could be maladaptive for

student success. Research on multiple modalities and dual-coding indicates students encode best when verbal and nonverbal representations of information are presented through mixed modalities, which contradicts the single modality approach of the matching hypothesis. Student motivation could also be negatively impacted by the implementation of learning styles models in the classroom. A student could attribute poor performance to a mismatch in learning style and teaching modality, and therefore have low self-efficacy on similar tasks.

Given the lack of empirical evidence in support of learning styles and the potential maladaptive effects of their implementation in the classroom, why are teachers still utilizing them? This content analysis will address this question by exploring the coverage of learning styles in popular educational psychology and introduction to education textbooks. Specifically, the focus will be on the following research questions: (a) Is discussion of learning styles present in the text? b) If it is present, to what extent, in terms of word quantity, is it covered? (c) How are learning styles defined? (d) Which models of learning styles are presented? (e) How does the textbook recommend implementing learning styles? (f) When learning styles are discussed, what references do the authors of the textbook cite and are those references based on empirical data? (g) Are the educational psychology and introduction to education textbooks consistent with regard to a-f?

<center>**Methods**</center>

Selection of Textbooks

Six major textbook publishers, Pearson Education, Cengage Learning, McGraw-Hill Education, Wiley, SAGE Publications, and Kendall Hunt, were contacted and asked to identify their most popular textbooks intended for use in educational psychology and introduction to education courses. Additionally, professors of introduction to education and educational psychology courses at Western Kentucky University were consulted to identify frequently utilized textbooks for these courses. Ten popular textbooks for each course were identified. The publishers were asked to send physical copies or allow for electronic access to their most current editions of those textbooks. The final list consisted of the ten introduction to education textbooks identified in Table 1 and the ten educational psychology textbooks identified in Table 2.

Coding

To design the methodology used in this review, two primary texts on content analysis were consulted (Holsti, 1969; Weber, 1990). Two content analyses of educational psychology textbooks were also referenced (Wininger & Norman, 2005; Wininger & Norman, 2010). Based on these texts and information discussed in the literature review regarding the definition of learning styles and the prevalence of their application in the classroom, the content analysis protocol was created. The protocol focused on the first six questions discussed above. Results for the introduction to education and educational psychology textbooks were compared to determine whether the discussion of learning styles is consistent between them. To develop and refine the protocol, a draft was used to code one textbook not selected for the review. Based on this

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draft, no revisions were deemed as necessary, and the remaining textbooks were coded

using the protocol. For the qualitative data analyses, after the categories for models,

definitions, and recommendations were identified, the lead professor was consulted and

consensus was reached on the final categories. The lead professor was also consulted for

three ambiguous responses and consensus was reached on the appropriate codes for each.

Table 1

Textbooks Used for Analysis: Introduction to Education

Authorship	Publication Year	Publisher
Arends	2015	McGraw-Hill
Hall, Quinn and Gollnick	2016	SAGE
Johnson, Musial, Hall, and Gollnick	2018	Pearson
Kauchak and Eggen	2017	Pearson
Koch	2016	Cengage
Ornstein, Levine, Gutek, and Vocke	2017	Cengage
Parkay	2016	Pearson
Powell	2015	Pearson
Ryan, Cooper and Bolick	2016	Cengage
Sadker and Zittleman	2016	McGraw-Hill

Table 2

Textbooks Used for Analysis: Educational Psychology

Authorship	Publication Year	Publisher
Cisero-Durwin and Reese-Weber	2017	SAGE
Eggen and Kauchak	2016	Pearson
Henson and Eller	2012	Kendall Hunt
Moreno	2010	Wiley
O'Donnell, Reeve, and Smith	2012	Wiley
Ormrod, Anderman, and Anderman	2017	Pearson
Santrock	2011	McGraw-Hill
Slavin	2018	Pearson
Snowman and McCown	2015	Cengage
Woolfolk	2017	Pearson

Presence of Learning Styles

The first question addressed was, "Is discussion of learning styles present in the text?" As revealed in Table 3, 16 of the 20 texts (80%) contained discussion of learning styles. Seven of the 10 introduction to education textbooks contained discussion of learning styles, and nine of the 10 educational psychology textbooks contained discussion of learning styles. It was determined that texts containing references to learning styles only within the context of multiculturalism lacked key aspects designated in the protocol, and thus they were not coded as learning styles. For example, in O'Donnell, Reeve, and Smith's (2012) educational psychology textbook, the authors include a section labeled, "Knowledge and Learning Styles," yet refer only to conflicts between learning styles of students with diverse cultural backgrounds.

To contrast the presence of learning styles in educational psychology and introduction to education texts, a chi-square analysis was conducted between "yes" and "no" responses and text type. Chi-square analysis revealed there were no differences between introduction to education and educational psychology textbooks with regard to presence of learning styles, X^2 (1, $N = 20$) = 1.250, $p = .264$.

Table 3

Frequencies of Presence, Definitions, and Recommendations of Learning Styles

Text Type	Present		Definition		Recommendation		
	Yes	No	Preference	Style	Differentiate	Variety	Cognition
Introduction to Education	7	3	2	5	3	3	1
Educational Psychology	9	1	6	3	1	4	4
Total	16	4	8	8	4	7	5

Definitions

The next question was, "How are learning styles defined?" The primary definitions varied across texts and presented learning styles as either preferences (approaches to learning and/or preferences in learning or studying) or styles (how an individual processes new information and/or learns better or more efficiently). A total of eight texts defined learning style as a preference and eight defined learning style as a style (see Table 3). Of the texts defining learning style as a preference, two were introduction to education and six were educational psychology textbooks. Five of the texts defining learning style as a style were introduction to education and three were educational psychology textbooks. To contrast the definitions of learning styles in educational psychology and introduction to education texts, a chi-square analysis was conducted between "preference" and "style" responses and text type. Chi-square analysis revealed there were no differences between introduction to education and educational psychology textbooks with regard to the definition of learning styles, X^2 (1, $N = 16$) = 2.286, $p = .131$.

Recommendations

For the question, "How does the textbook recommend implementing learning styles?" data was coded into one of three categories: differentiate (teachers should differentiate or tailor instruction to match student learning style), variety (teachers should use a variety of instructional methods), or cognition (teachers should consider the cognitive processes in the ways children learn). As shown in Table 3, four texts indicate teachers should differentiate based on learning styles. Of those texts, three were introduction to education and one was educational psychology. Seven texts, three

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introduction to education and four educational psychology, indicated teachers should use a variety of instructional methods. Five texts, one introduction to education and four educational psychology, indicated teachers should consider cognition when choosing instructional methods. To contrast the recommendations for learning styles in educational psychology and introduction to education texts, a chi-square analysis was conducted between "differentiate," "variety," and "cognition" responses and text type. Chi-square analysis revealed there were no differences between introduction to education and educational psychology textbooks with regard to the recommendations for learning styles, X^2 (1, N = 16) = 2.736, p = .255.

Words Written

To address the question, "If discussion of learning styles is present, to what extent, in terms of word quantity, is it covered?" the number of total words written in sections discussing learning styles and words in text were obtained for each textbook. Words in text excluded information presented in tables, marginal notes, and informational or activity boxes. Coverage of learning styles ranged from zero to 3,834 total words written and zero to 2,408 words in text. Descriptive statistics for words in text and total words written are depicted in Table 4. To assess differences between introduction to education and educational psychology textbooks with regard to word quantity, an independent samples t-test was conducted with introduction to education versus educational psychology textbook data as the independent variables and word quantity as the dependent variable. The assumptions for independent samples t-tests were met for all t-tests run, except empirical references, for which the Levene's Test for Equality of Variances reached significance. The independent samples t-test for words in

text revealed no significant difference between text type, t (14) = -1.033, p = .319. No significant differences were indicated between text type for total words either, t (14) = -1.209, p = .247.

Empirical References

The next question was, "When learning styles are discussed, what references do the authors of the textbook cite and are those references based on empirical data?" The number of empirical references cited in the texts ranged from zero to nine, and the number of non-empirical references cited in the texts ranged from zero to 20. For the purpose of the protocol, a research study was identified as empirical if it reported the collection and analysis of primary data through observation or experimentation. Non-empirical references included peer-reviewed journal articles without primary data collection, meta-analyses, books, and book chapters, but did not include cited paper presentations. Descriptive statistics for empirical and non-empirical references are depicted in Table 4. To address the contrast between text types for the question, an independent samples t-test was conducted with introduction to education versus educational psychology textbook data as the independent variables and number of references as the dependent variable. The t-test for equality of variances not assumed revealed a significant difference between text type for number of empirical references, t (9.571) = -2.509, p = .042, η^2 = .208. The educational psychology textbooks included significantly more empirical references than the introduction to education textbooks. No significant differences were revealed between text type for number of non-empirical references, t (14) = -1.855, p = .720.

Table 4

Descriptive Statistics for Word Count and Empirical References

Text Type	*M*	*Mdn*	*SD*	Skewness	Kurtosis
Words in Text					
Intro. to Ed.	610.857	711.000	251.808	-.110	-2.176
Ed.Psych	882.000	768.000	653.593	1.859	3.769
Total	610.700	519.500	559.707	1.758	4.800
Words Total					
Intro. to Ed.	676.714	711.000	279.858	.064	-1.660
Ed.Psych	1186.889	803.000	1080.514	2.197	5.285
Total	770.950	628.00	852.447	2.604	8.814
Empirical References					
Intro. to Ed.	.429	.000	.787	1.760	2.361
Ed.Psych.	2.889	2.000	2.804	1.414	2.037
Total	1.813	1.000	2.455	1.945	4.139
Non-Empirical References					
Intro. to Ed.	5.000	7.000	3.559	-.373	-2.038
Ed.Psych.	9.222	8.000	5.118	1.209	1.653
Total	7.375	7.500	4.870	1.002	2.034

Models

The final question was "Which models of learning styles are presented?" The 14 various models of learning styles identified in the textbooks are presented in Table 5. The introduction to education textbooks presented 12 different models and the educational psychology textbooks presented nine different models of learning styles.

Table 5

Learning Styles Models Present in Textbooks

Authors	Learning Styles Models														
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Introduction to Education Textbooks															
Arends	A	B	C	D											
Hall, Quinn & Gollnick															
Johnson, Musial, Hall, & Gollnick					E						K				
Kauchak & Eggen			C			F	G					L			
Koch													M		
Ornstein, Levine, Gutek, & Vocke															
Parkay															O
Powell														N	
Ryan, Cooper & Bolick															
Sadker & Zittleman										J	K				
Introduction to Education Totals	1	1	2	1	1	1	1	0	0	1	2	1	1	1	1
Educational Psychology Textbooks															
Cisero-Durwin & Reese-Weber			C												
Eggen & Kauchak			C			F	G								
Henson & Eller	A	B													
Moreno															O
O'Donnell, Reeve, & Smith															
Ormrod, Anderman, & Anderman															O
Santrock						F		H							
Slavin								H							
Snowman & McCown				D				H	I						
Woolfolk	A	B	C							J					
Educational Psychology Totals	2	2	3	1	0	2	1	3	1	1	0	0	0	0	2
Overall Textbook Totals	3	3	5	2	1	3	2	3	1	2	2	1	1	1	3

Note. A) Five Stimulus Strands: Environmental, emotional, sociological, psychological and physiological (Dunn & Dunn, 1992); B) Four-way typology: concrete-sequential, abstract-random, abstract-sequential, and concrete-random learners (Gregorc, 1982); C)Visual versus Verbal Learners (Mayer & Massa, 2003); D) Field-Dependent versus Field Independent; E) Four-dimension information-processing learning-style model: Sensory- Intuitive, Visual-Verbal, Active-Reflective, Sequential-Global (Felder & Silverman, 1988); F) Deep versus surface; G) Analytic versus Holistic; H) Impulsive versus Reflective; I) Mental Self-Government based on Sternberg's 12 mental self-government styles; J) Cognitive, affective, physiological; K) Visual, Aural/auditory, Kinesthetic/Tactile; L) Visual, Verbal, Tactile ; M) Visual, Auditory, Read/Write, Kinesthetic; N) Visual (seeing), Auditory (hearing), Tactile (touching), and Kinesthetic (moving); O) Model not specified.

Discussion

A review of literature indicates there is a lack of empirical evidence demonstrating improved learning outcomes for students whose instruction is matched with their learning styles. There has also been minimal research conducted to establish the validity or reliability of learning styles instruments. Additionally, the implementation of learning styles in the classroom could be maladaptive to students' encoding, motivation, and self-efficacy. Despite these concerns, the implementation of learning styles models has persisted amongst educators. This content analysis was conducted to examine the coverage of learning styles in texts used for introduction to education and educational psychology courses, which often lay the foundation for future teachers' understanding of student learning and instructional practices.

Overall, discussion of learning styles was identified in 16 of the 20 selected textbooks and ranged from zero to 3,834 total words written and zero to 2,408 words in text. Within those 16 textbooks, half defined learning style as a preference or approach to learning and the other half defined it as a style or way a student learned. This is problematic, as it implies half of the textbooks include definitions contradicting the findings of empirical research. It was surprising to find that only 25% (N = 4) of textbooks discussing learning styles recommended teachers differentiate or match instructional strategies to learning styles. Seven of the remaining textbooks recommended teachers utilize a variety of instructional strategies and five recommended that cognitive processes be considered when designing instruction. The number of references included in the textbooks ranged from zero to nineteen total references, with the most empirical references in any textbook being five. Interestingly, although half of the textbooks

defined learning style as a style, only a quarter of textbooks recommended differentiating instruction based on learning styles. Incorrectly defining the term or conceptualizing the construct does not necessarily lead to making an inappropriate instructional recommendation regarding learning styles. However, one has to wonder whether the incorrect conceptualization alone is enough to allow the myth to persist among students in these classes.

The final research question addressed was, "Are the educational psychology and introduction to education textbooks consistent with regard to the previous research questions?" Overall, the results of this content analysis revealed fewer significant differences between introduction to education and educational psychology textbooks than hypothesized. With regard to the presence of discussion of learning styles and the quantity of coverage, no statistically significant differences were revealed. While more introduction to educational texts conceptualized learning styles as styles (five versus three), the difference was not significant. The same pattern emerged for the practice recommendations with three introduction to education texts recommending differentiation based on learning styles versus one educational psychology text. Only one comparison of text types, the number of empirical references cited in the text, was statistically significant. Educational psychology texts had more empirical references. There were observed, but not statistically significant, differences between the three recommendation types with regard to total number of empirical references cited. The mean number of empirical references for textbooks recommending teachers to use a variety of instructional practices was 2.43 references. The mean number of empirical references was 1.80 for textbooks recommending cognitive processes be considered and

only .75 for textbooks recommending teachers differentiate instruction based on learning styles.

The most prevalent empirical articles cited in the textbooks in large part failed to support the implementation of learning styles. Mayer and Massa's (2003) journal article, "Three Facets of Visual and Verbal Learners: Cognitive Ability, Cognitive Style, and Learning Preference," was referenced the most times of all empirical journal articles, with two references by introduction to education and three references by educational psychology textbooks. This study was a correlational study, and the only significant correlation was between the paper-folding test and several self-report learning preference measures (Mayer & Massa, 2003). More importantly, a lack of significant correlations was reported between learning styles measures and several other constructs such as vocabulary tests and SAT performance. Thus, this reference could be used to show support or lack of support for learning styles. Krätzig and Arbuthnot's (2006) journal article, "Perceptual Learning Style and Learning Proficiency," was referenced by four educational psychology textbooks but zero introduction to education textbooks. This correlational research study found no significant differences between learning style and performance. Pashler et al.'s (2009) journal article, "Learning Styles: Concepts and Evidence," was the most frequently referenced non-empirical article by both text types. It was referenced a total of seven times, three by introduction to education and four by educational psychology texts.

Six of the fourteen models of learning styles presented in the textbooks contained the visual and verbal/auditory components of the VARK model. Six of the seven introduction to education textbooks and four of the nine educational psychology

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textbooks referred to at least one of the six models. Within the discussion of learning styles, derivatives of VARK model are the most common; however, more than one-third of the texts presented to teachers in training did not refer to these models at all. This implies there is a disconnect between the information presented in the textbooks and the methodologies being implemented in the classroom.

Implications

Interestingly, despite the continued debate on learning styles in education, three introduction to education and one educational psychology textbook did not include a discussion of learning styles and recommendations related to them. The notion that instruction should be matched to students' learning styles is recommended by only one of the popular educational psychology textbooks and three of the introduction to education textbooks. A majority (75%) of texts recommended that when designing a lesson, teachers should either consider incorporating a variety of instructional techniques or be mindful of cognitive processes, rather than teaching to accommodate specific learning styles. With four textbooks not including a discussion of learning styles and 12 not recommending matching instruction to learning styles, this only further motivates pursuit of the question of why the idea of implementing learning styles models in the classroom persists. When and where are teachers acquiring these beliefs?

Although the definitions found within the textbooks could be coded into two distinct categories, no two definitions were alike. Similarly, the recommendations varied greatly between the different textbooks of the same and separate text type. For example, when reviewing the most frequently used textbooks for introduction to education and educational psychology courses at Western Kentucky University, the definition of

learning styles is inconsistent. In the introduction to education text, they are defined as, "Ways in which individuals learn most effectively and efficiently" (Powell, 2015, p. 59). In contrast the most commonly used educational psychology textbook defined learning styles as, "Characteristic approaches to learning and studying" (Woolfolk, 2017, p. 135). Both of these textbooks indicate that the basic information regarding learning styles can be beneficial to consider. Powell (2015) recommends that, "Incorporating what we know about multiple intelligences and learning styles into our plans for instruction helps meet the learning needs of more students" (p. 59). Whereas, Woolfolk (2017) explains, "Looking at individual students' approaches to learning might help teachers appreciate, accept, and accommodate student differences and differentiate instruction" (p. 135). The disparities of language and lack of clarity in the discussions of learning style found in these textbooks could lead to confusion for preservice teachers.

Limitations

One limitation of the current study is the low statistical power generated by the number of books selected for the content analysis. Another limitation in this study was that the final list of textbooks was compiled from a variety of sources. A list of the most popular textbooks according to sales numbers would have shed light on which introduction to education and educational psychology textbooks, and subsequently what learning styles content, are being taught to the majority of future teachers across the United States. These numbers were requested; however, some publishers were unwilling to provide them.

Recommendations for Future Research

Why is the idea of learning styles so prevalent when it is not being perpetuated in the majority of textbooks related to teacher education? Perhaps a better avenue is to explore the ways P-12 schools incorporate learning styles into their educational programs. What processes or assessments are teachers using to identify learning styles, and how are they using that information in the classroom? Similarly, in what ways are university-based educator preparation programs introducing learning styles? It would be interesting to explore the considerations professors make when selecting instructional materials and whether they value the inclusion of discussion regarding learning styles in their textbooks.

Another area of future research would be to explore students' beliefs regarding learning styles prior to arriving at college. We know students enter college with preconceived notions of who they are as learners. For students who have been told they learn better when taught in a certain style, are their learning outcomes negatively impacted when taught in a different style? When they are exposed to information contradicting the notion of matching instruction to learning styles, how hard would it be to change students' existing beliefs? It would be interesting to explore the best mediums for changing these misperceptions**.**

Conclusion

The topic of learning styles has a long history of debate amongst educators and researchers. Despite shortcomings in research supporting learning styles, the notion of matching instruction to learning style is still propagated. The question then, is where are emerging teachers developing the idea that instruction should be modified based on

learning styles? Through the content analysis of introduction to education and educational psychology textbooks, only four textbooks were identified as recommending the matching of instruction to learning styles. While the definitions and recommendations vary slightly between each textbook, overall the only statistically significant difference identified between text types was the number of empirical references present. The original hypothesis of this research was that teachers might think it is important to differentiate instruction based on learning styles because that information is presented in their textbooks; however, that hypothesis was not supported. The majority of textbooks did not recommend the practice of matching instruction to learning styles, which leads one to question whether preservice teachers are acquiring this belief from another source or if the inclusion of a discussion of learning styles in the textbooks, regardless of the recommendations, perpetuates the notion of learning styles.

Given the abundance of contradictory information regarding learning styles and the potential disparities of language and lack of clarity in textbooks, how then should learning styles be addressed by professors in teacher preparation programs? Teachers will likely face situations requiring their understanding of learning styles; consequently, it is important that they be addressed in introduction to education and educational psychology courses. It is important for teachers to know the commonly used terminology and suggested application of learning styles in the P-12 setting. It is even more important that they understand what the empirical literature says about learning styles and the potential maladaptive effects that utilizing learning styles could have on their students. Preservice teachers should be made aware that not only do students learn information most effectively when it is presented in multiple modalities, but that utilizing students'

learning styles could negatively impact their learning and motivation. A careful and frank discussion of learning styles can provide preservice teachers an opportunity to think critically. This is something that should be done regarding all available instructional techniques with an emphasis on the empirical literature supporting them, as well as discussion of both positive and negative effects each technique may have on students.

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Appendix A. Content Analysis Protocol

Text Title		**Author**	
Edition		**Publication Year**	
This textbook is primarily used for which course (circle one)		Introduction to Education	Educational Psychology
Are learning styles discussed in the text?		**Circle:** YES or NO	
How much of the text is devoted to learning styles?			
Indicate all page numbers that cover learning styles			
Which references are given for learning styles within the pages listed above?		**Empirical:** **Non-Empirical:**	
How are learning styles defined?			
Which models of learning styles are presented?			
How does the textbook recommend implementing learning styles?			