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Study of Preservice Teachers' Preparation for DI: Investigating Data for Secondary Teacher Candidates in One Research University

Matthew TRP Dittrich
Lindenwood University

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by

Michael TRP Dittrich

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Sherrie Wisdom	07/31/2020
Dr. Sherrie Wisdom, Dissertation Chair	Date
Margaret Scordias	7/31/2020
Dr. Margaret Scordias, Committee Member	Date
Kelly E Dickinson	7-31-2020
Dr. Kelly Dickinson, Committee Member	Date
Jason Adams	7-31-20
Dr. Jason Adams, Committee Member	Date

Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work here at Lindenwood University and that I have not submitted it for any other college or university course or degree here or elsewhere.

Full Legal Name: Michael TRP Dittrich

Signature:  Date: 7/31/20

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Abstract

This dissertation, *A Study of Preservice Teachers' Preparation for DI: Investigating Data for Secondary Teacher Candidates in One Research University*, was a mixed methods study of secondary data that analyzed the results of undergraduate and graduate teacher candidate scores on the three different instruments, which were used by a midwestern university in their teacher preparation program for state teacher certification. The purpose of this study was to examine if graduate preservice teacher candidates and undergraduate preservice teacher candidates were equally prepared in the area of differentiated instruction. The study also included an examination of preservice training among these teacher candidates. In essence, this study presented a comparison of Master of Arts in Teaching programs to Bachelor of Arts in Teaching programs, to determine which produced better-trained preservice teacher candidates in terms of DI knowledge and planning.

The researcher anticipated there would be no difference in preparation, since all preservice teacher candidates, both graduate and undergraduate, were from the same midwestern university, took courses together, and were assessed using the same instruments at the same time in their programs, and during a single year. The 32 randomly selected participant from the four-year Research University in an urban area outside of a major metropolitan area had archived data on all three instruments. The location of the university was in a city of approximately 65000 residents. The University offered 131degree programs and was accredited by the Higher Learning Commission. The University had two campuses located approximately 40 miles apart, in two different states, at the time of this writing.

The study utilized *t*-Test, *F*-Test, and PPMCC in the analysis of three research questions. The researcher investigated three types of questions in this study to determine whether DI had a relationship with the overall teaching and learning practices of secondary preservice school teacher candidates. The questions explored whether the graduate and undergraduate candidates were equally prepared on the same instruments, across instruments, and in knowledge, as well as application.

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Chapter One: Introduction

Today's rapidly increasing technological and postmodern environment demands that educators quickly grasp, rearrange, create, and integrate new devices, ideas, and concepts that harmonize and fuse with students' different backgrounds and experiences. Learners' varied experiences indicate multiple points of view and multiple ways of knowing. When exploring learning in experimental, intentional, and unconventional ways, students learn their unique and specialized effects on the world and realize their points of view differ from other learners. Accordingly, educators need to understand the learning style of each student to provide the best educational experiences.

Geel et al. (2018) stated that adapting instruction to individual student needs is "a cornerstone of effective instruction" and "considered the gold standard teachers should strive for" (p.206). Elrick (2018) stated teachers need to explore educational learning styles to promote human development. No single academic subject presents opportunities for individuals to create and control their learning styles and develop their imagination and identity. By employing different learning styles, teachers can view learning styles as opportunities for limitless possibilities. Singmaster (2018) discussed teachers who support nonquantifiable experiences foster awareness of multiple perspectives, provide emotional therapy that helps form identity, and nurture the imagination of creative beings. Educators who used nonquantifiable experiences become interactive receivers of information and participants in the creative process of transforming both individuals and society.

Cole (2008) stated that with the use of various learning styles in educational development, children acquire the ability to perform transformational acts, enhancing

their competence and confidence, understanding their thought processes, claiming ownership of their styles of learning, and bringing order to their environment. Students allowed to experience learning styles from an early age may learn, over time, learning's endless possibilities.

A variety of motivational factors influence learning, including task value, academic efficacy, and achievement goals (Ricco, Pierce, & Medinilla, 2009; Soyer & Kirikkanat, 2019). Task value refers to the individual's degree of personal interest in a given academic task and the extent to which one considers the usefulness, relevance, or importance of the task (Ricco et al., 2009; Soyer & Kirikkanat, 2019). Researchers often treat academic efficacy as an expectancy component of motivation that indicates the individual's perceptions of competence or success on academic tasks (Ricco et al., 2009; Soyer & Kirikkanat, 2019**)**; the higher the student's interest in a task, the higher the level of performance. Achievement goals may include an academic task, showing a student's performance goals and mastery goals (Duchesne & Larose, 2018; Ricco et al., 2009; Soyer & Kirikkanat, 2019). A student's level of engagement predominantly indicates student success. To raise student engagement levels, researchers suggested directly tailoring the differentiated instruction (DI) model to each student.

The broader arena of the DI model incorporates Kolb's (Kolb, Boyatzis, & Mainemelis, 2014) learning styles theory, which indicates that people think and learn in different ways. According to this theory, students learn best if educators match their style of learning to the appropriate pedagogy (Kolb et al., 2014). According to research regarding the learning styles theory, educators need to understand that different learning styles do not indicate a difference in student ability; rather, learning styles indicate

different ways of processing information (Singmaster, 2018). Applying learning styles theory to education shows that interaction of instruction and individual student learning styles produce student achievement (Kolb et al., 2014). Educators using this concept as an educational tool follow Kolb's learning theory's three steps: (a) students show a predilection concerning their style of learning, (b) students demonstrate differences in their facility to learn about certain types of material, and (c) the matching of instructional design, indicated by classifications of an individual's learning style, presents better educational outcomes (Newton, 2015). Countries worldwide use learning style theories. According to Willingham, Hughes, and Dobolyi (2015), more than "90% of teachers in five countries (the United Kingdom, the Netherlands, Turkey, Greece, and China) agreed that individuals learn better when they receive information tailored to their preferred learning styles" (p. 266).

To test the presumption of widespread learning style practices and beliefs, Willingham et al. (2015) surveyed 313 male (n = 141) and female (n = 172) individuals with a mean age of 35.2 years. The researchers asked participants to rate their responses on a seven-point Likert scale to the statement, "There are consistent differences among people in how they learn from different experiences: specifically, some people generally learn best by seeing, some generally learn best by listening, and some generally learn best by doing." With 1 = *strong disagreement* and 7 = *strong agreement*, results from the study showed a mean rating of 6.35 (SD = 1.11; Willingham et al., 2015). Although results indicated that participants agreed with the statement, Willingham et al. maintained that over the 30 years before this study, little scientific evidence indicated that learning styles worked in practice. If the learning style theory was false and went unchecked, the

researchers saw it as justification for poor classroom performance. Moreover, lack of student performance often indicated "the expectation that the teacher will make individual accommodations that go beyond quality instruction" (Willingham et al., 2015, p. 268). As such, Willingham et al. (2015) maintained that implementing learning styles theory was ineffective and a waste of time and resources. Rather, the researchers suggested that teachers need to focus on learning other theories to aid student instruction.

Although researchers criticized learning styles theory and presented it as a myth, Smets and Struyven (2018) found that many educators still employed learning style topologies. According to the authors, a hermeneutical perspective was necessary for the learning styles debate. The researchers presented a critical discourse to discourage the use of learning styles. A social analysis presented power structures in education. Smets and Struyven pointed to critics' lack of educational expertise and noted that a more appropriate discourse on learning styles — for example, discussing learning styles — could help educators understand the educational field.

Although research is needed to explore reasonable criticisms of learning styles theory's efficacy, many critics base their claims on their supposed expertise or reinforce their arguments with nonrational support (Smets & Struyven, 2018). Researchers need to debate learnings styles properly, as many teachers refer to the debates around learning styles in their intent to practice DI. Smets and Struyven (2018) sought to reframe the debate, separating the theory from scientific and nonscientific arguments. Awareness of learning styles presents teachers with more tools for managing increasingly diverse student bodies in the classroom. According to Smets and Struyven, "Learning styles can

provide teachers with more insight regarding student diversity, and they are often intended to impact instructional design" (p. 12).

Problem Statement

Current problems regarding teaching practices are multifaceted. For example, there is a need for teachers to integrate support services and DI in innovative ways based on poverty rates and the increasing number of students, and the increase in diversity of the overall population (Corthell, 2014). Whereas the percentage of White students has decreased, that of Hispanic students has grown, as has the number of students speaking a language other than English at home (U.S. Department of Education, 2019). Dunn (1968) noted teachers faced with students speaking English as a second language and managing a diverse classroom, many educators showed a lack of understanding of the student body, subconsciously labeling minority students as "uneducable" (Dunn, 1968). This work was later cited by Harry and Klingner (2005) when they discussed Dunn being concerned about the overrepresentation of minority students in classes for struggling learners (Harry & Klingner, 2005).

Fish (2019) indicated teachers from public school systems labeled a disproportionate number of ethnic minority youth living in urban environments. Compared to White students, many Black and Latino students attended poorly resourced and overcrowded schools in the 1960s and 1970s. Since then, researchers conducted similar studies, yet failed to identify any solutions (Fish, 2019). Migration and immigration have been ongoing occurrences in the United States and will remain so for decades to come. As living conditions worsened in many South American countries, increasing numbers of Spanish-speaking migrants headed for the United States. With the

demographics of Latino families in the United States of America growing, increasingly more Latino children attended public schools, most of them from bilingual households in which Spanish was their first language (Cycyk, Bitetti, & Hammer, 2015). Cycyk et al. (2015) found these students suffered from educational disadvantages, due to a lack of exposure to the English language. In addition, nationally, Latino children scored much lower in preschool than their English-speaking peers in the subjects of language, literacy, and mathematics. Lower school scores could lead to depression, especially if these students lacked social support. Employing DI and different learning styles may improve the literacy levels of immigrant children and increase their abilities to master their studies. Before using these techniques, however, educators must receive training to know how and when to implement these strategies. Without training, preservice candidates may not recognize or be able to implement DI strategies to challenge students at various levels. Not having a full range of strategies to engage the students in learning would hinder student advancement in learning (Tomlinson & Allan, 2000). DI is a pedagogical approach providing educators with a launching point for meeting the needs of all students. Teachers should not use the same approach for all students. Teachers should focus on individual skill building and differentiate activities deliberately to ensure students receive the instruction that will match their needs. The complexities of multiple children in a room with varied needs keep this from being a simple or easy task. DI should be recognized as a complex teaching skill (Deunk, Doolaard, Smalle-Jacobse, & Bosker, 2015).

Deunk et al. (2015) stated there is a need for more information about effective practices in the area of DI. A recent meta-analysis and review of DI practices showed DI

has potential for improving student performance when the practices are implemented well (Deunk et al., 2018). Schleicher (2016) discussed the recent study showing teachers across different countries do not adapt the instruction their classrooms to student needs (Schleicher, 2016). A student who struggles may be provided with tasks that are too difficult while other high ability students provided learning opportunities that were easily mastered or already mastered (Tomlinson et al., 2003).

Purpose Statement

The purpose of this study was to determine if DI has a relationship with the overall teaching and learning practices of secondary preservice teacher candidates. The study also included an examination of preservice training among these teacher candidates. Finally, this study presented a comparison of Master of Arts in Teaching programs to Bachelor of Arts in Teaching programs to determine which produced better-trained preservice teacher candidates in terms of DI knowledge and planning.

Research Questions and Hypotheses

The overarching research question that guided this study was, what is the difference, if any, in teacher candidates' knowledge and application of differentiated instruction in planning lessons, based upon enrollment in Masters of Arts teacher training programs versus enrollment in the Bachelor of Arts teacher training programs? Measures used in analysis were the Missouri Educator Evaluation System (MEES), Lindenwood Education Exit Survey (LEES), and Missouri Preservice Teacher Assessment

Three specific questions were addressed:

RQ1: To what extent do the undergraduate- and graduate-level teacher educator programs at one Research University equally prepare teacher candidates to use differentiated instruction in their classrooms as a beginning teacher?

The null hypotheses related to this question were:

$H_0 1_{\text{-LEES}}$: On the LEES, the scores of undergraduate preservice teachers will not differ from that of graduate preservice teachers.

$H_0 1_{\text{-MEES}}$: On the MEES, the scores of undergraduate preservice teachers will not differ from that of graduate preservice teachers.

$H_0 1_{\text{-MoPTA}}$: On the MoPTA, the scores of undergraduate preservice teachers will not differ from that of graduate preservice teachers.

RQ2: To what extent do the results of the LEES, MEES and MoPTA differ when analyzed by education level (graduate/undergraduate)?

The null hypotheses related to this question are:

$H_0 2_{\text{-U}}$: When comparing results across measures for undergraduate preservice teachers, the results comparisons for LEES to MEES, MEES to MoPTA, and LEES to MoPTA will not differ.

$H_0 2_{\text{-U}}$: When comparing results across measures for graduate preservice teachers, the results comparisons for LEES to MEES, MEES to MoPTA, and LEES to MoPTA will not differ.

RQ3: When comparing qualitative and quantitative results by area of differentiated instruction (leadership, curriculum, instruction, learning environment, and assessment), to what extent will the results differ and/or be correlated within each area?

The null hypothesis related to this question is:

$H_0 3_{-U}$: When compared by DI area, the results for qualitative and quantitative measures will not differ nor have a moderate or stronger amount of correlation.

Method

Quantitative methodology is appropriate for researchers seeking to quantify data with the use of statistical analyses and numerical results. Researchers who wish to explore the lived experiences of participants opt for a qualitative approach. Mixed-methods, in turn, incorporates both quantitative and qualitative elements to provide a deeper overall picture of the phenomenon under study (Creswell & Clark, 2018).

This study utilized a mixed-methods approach, which is appropriate when analyzing both quantitative and qualitative data. The researcher analyzed existing quantitative and qualitative data from a private Research University with identifiers removed. Data comprised university exit surveys, and two separate statewide performance instruments. One provided quantitative data and the other both quantitative and qualitative data. Deidentified data were obtained from a randomly selected sample of participants taking each assessment during the 2016–2017 academic school year. Forty-nine participants from the same Research University took all or some of the three measures, Missouri Educator Evaluation System (MEES), Lindenwood Education Exit Survey (LEES), and Missouri Preservice Teacher Assessment (MoPTA). Twenty-four of these were Lindenwood undergraduate pre-service candidates, 22 were graduate pre-service candidates, and two were not identified. Thirty-two of these participants, 14 undergraduate and 18 graduate students, had data for all three instruments. Analysis focused on data for the 32 that had results for all instruments. No new data were generated for this study.

Study Limitations

The study had multiple limitations. The research was conducted at one university, which limited participants from a cross-section of other universities. The data collected were made available for all three testing instruments. Data were delivered on a corrupted file and the data were not accessible from the providing university staff member. One year of data and all testing instruments were able to be recovered for only a portion of the participants. Because there was only one year of overlap for two of the instruments, there was only one year of data available to the researcher. An additional limitation was the number of participants in the sample groups that completed all three testing instruments.

Definition of Terms

Alternative Route: "A teacher preparation program that includes the general education curriculum, content and professional studies, and clinical experiences serving pre-service teachers who enter college after graduation from high school and results in a bachelor's degree" (MODESE, 2019, p. 1).

Clinical experience: Teacher candidates are afforded the opportunity to put preparation into practice. Teacher candidates participate in a common practice referred to as student teaching. During this time, candidates participate in a gradual increase in classroom duties and instruction in their content area with a participating school district.

Department of Elementary and Secondary Education (MODESE): This department administers primary and secondary public education in the state of Missouri. MODESE is the certifying agent for preservice teaching candidates in the state of Missouri.

Differentiated instruction (DI): "Differentiated instruction is an instructional practice that promotes varied and adapted approaches to teaching based on the individual student versus the classroom as a whole" (Tomlinson, 2003, p. 131). Tomlinson et al. (2003) identified the following themes of DI: assessment, learning environment, curriculum, leadership, and instruction. "Through DI, teachers modify their curriculum for their students versus the students having to change to fit the curriculum" DI is further discussed in Chapter Two (Tomlinson et al., 2003, p. 131).

Lindenwood Educator Exit Survey: LEES is survey expected of all Lindenwood teacher candidates upon graduation from an undergraduate or graduate program for preservice teachers (Personal Communication, B. Kania-Gosche, November 2, 2017).

Missouri Pre-Service Teacher Assessment: The MoPTA is an evidence-based performance assessment designed to assess the instructional capability of pre-service teachers prior to receiving teaching license. This assessment evaluates teacher candidates on their ability to have an impact on student learning as stated in the Missouri Teacher Standards and Quality Indicators (Department of Elementary Secondary Education, [MODESE], 2017).

Model Effective Evaluation System: The MEES is a collection of assessments formative in nature and leads to continuous improvement. The assessments are aligned to standards that reflect excellence. They build a culture of informing practice and promoting learning; and use multiple, balanced measurements that are fair and ethical (MODESE, 2016b).

Teacher candidate: "Teacher candidates are in the preparation process to enter the profession. In the Clinical Experience, teacher candidates are afforded the opportunity to

put preparation into practice. Also called student teachers or teacher interns in the literature" (MODESE, 2017).

Traditional teacher program: "An individual completes a four-year, college-recommended course of study, does student teaching, passes the designated assessment test, and graduates with a bachelor's degree in a field of education and is issued an initial certificate" (MODESE, 2019, p. 1).

Summary

Chapter One began with a statement of the importance for every educator to understand the learning styles of individual students and how to provide the best educational experience. Next, the researcher discussed the need for teachers to explore different learning styles and approaches to promote student learning. In addition, strategies are needed to allow students to create and control their own learning.

The chapter included the purpose of the study and a list of the research questions addressed by the study. The chapter ended with an overview of the methodology and definition of key terms. Chapter Two will provide a review of the literature to support the study.

Chapter Two: Literature Review

Introduction

A variety of motivational factors influence learning, including task value, academic efficacy, and achievement goals (Ricco et al., 2009). Task value is an individual's degree of personal interest in a given academic task and the extent to which the individual considers that task useful, relevant, or important (Ricco et al., 2009). As an expectancy component of motivation, academic efficacy presents the individual's perceptions of competence or success in academic tasks (Ricco et al., 2009). The greater the student's interest in a particular task, the higher the levels of performance. Achievement goals inherent in an academic task and include performance goals and mastery goals (Ricco et al., 2009).

Student engagement is the primary indication of student success (DeVito, 2016). Students engaged at low, middle, or high levels in class had student engagement levels showing a direct correlation to learning. Students typically engage at a low level when teachers use a more direct approach; in turn, higher student engagement results from teachers providing authentic learning experiences directed at the student's learning level. Teachers looking to raise student engagement levels should tailor the instruction directly to each student (Johnson, 2012).

DI is an instructional practice by which educators use diverse and reformed methods of teaching based on the individual student versus the classroom as a whole (Jensen, 2019; Tomlinson, 2001). Teachers who used DI modified their curriculum to their students; students did not change to fit the curriculum. In January 2011, the Office

of Special Education promoted this instructional strategy to allow all children throughout the State of Missouri access to quality education.

In this study, the researcher seeks to determine whether DI has a relationship to the overall teaching and learning processes for secondary preservice teacher candidates. The literature indicates how educators using DI raise levels of student engagement, helping middle school and high school students improve content mastery. Existing research shows the difference in implementing DI in middle school and high school levels compared to implementation in elementary school levels. Accordingly, the researcher of this study addressed an analysis of preservice training among teachers and a comparison of which, if either, teacher preparation program (Master of Arts in Teaching or Bachelor of Arts in Teaching) produced better-trained teaching candidates in terms of DI preparation.

The first step in this study was conducting an extensive review of the literature on the topic. Sources consulted were academic journals from databases, including JSTOR, EBSCOhost, and LexisNexis. Obtaining information to address the primary questions and sub-questions entailed a review of articles on DI—or the lack thereof—to study the impact of DI on different educational settings.

Student Engagement

Student engagement frequently serves as a gauge of effective classroom instruction; accordingly, educators have come to value student engagement as an outcome of educational improvement activities. At high levels of student engagement, students are attracted to their work, persist in their efforts despite challenges and obstacles, and take visible pleasure in accomplishing their tasks. Levels of student

engagement also indicate the students' need, willingness, and drive to participate in the education process, showing their engagement as successful learners at a visceral level (Sinatra, Heddy, & Lombardi, 2015).

Due to the simple but rather broad definition of student engagement, theorists and educators rarely agree on how to present student engagement in a way that educators can use to tailor instruction (Sinatra et al., 2015). Many definitions include both psychological and behavioral components. Among the factors identified as markers for student engagement are challenge level, student-faculty interaction, collaborative learning, and supportive learning environments. Strong relationships between students and students and teachers further indicate the level of student engagement (Shernoff et al., 2016).

Educators must actively create conditions that foster student engagement (Sinatra et al., 2015), which requires a shared working definition of student engagement among faculty. In addition, teachers must articulate learning criteria and provide students with distinct, immediate, and constructive feedback that includes the skills needed to be successful learners. Subsequently, students internalize the learning process, incorporating learning as an aspect of their personalities.

Authentic learning tasks intentionally focused on a student's learning level present a greater opportunity for students to make connections. Teachers should adapt learning strategies to students' learning profiles, interests, and readiness (Tomlinson, 2015). Prior literature indicates a correlation between student engagement and teacher effectiveness. Therefore, this study begins with a definition of student engagement, followed by discussions of the theories and their significance, perceptions of student

support, and methods of stimulating engagement. Describing teacher effectiveness occurs through investigating and exploring its theories and significance.

Educators emphasize the importance of institutional support for teacher effectiveness in the classroom. The researcher briefly discusses institutional support in this literature review. This hypothesis showed the significance and interconnectedness of teacher effectiveness and student engagement. Finally, this chapter presents the gap between teacher effectiveness and student engagement.

General Theories of Student Engagement

Dewey (1938) believed educators should provide children with opportunities to participate in learning activities that resemble real-life scenarios. Because educators lack a clear definition of student engagement, teachers have struggled to implement student education models that developed student engagement (Matthews et al., 2018; Sinatra, Heddy, & Lombardi, 2015).

Morse and Allensworth (2015) discussed the idea of the whole child and the need to engage the school, whole community, and the whole child. She argued that students must be challenged to serve as partners in their learning and in their community. Morse presented the ideal portrait of student-centered education, an image that translates into a teacher and student engagement model of learning, much like the thoughts of Dewey (Morse & Allensworth, 2015).

> Imagine a school where democracy is more than a buzzword, and involvement is more than attendance. It is a place where all adults and students interact as co-learners and leaders, and where students are encouraged to speak out about their schools. Picture all adults actively valuing student engagement and

> empowerment, and all students actively striving to become more engaged and empowered. Envision school classrooms where teachers place the experiences of students at the center of learning, and education boardrooms where everyone can learn from students as partners in school change. (Fletcher, 2005, p. 4)

On an elementary level, researchers have defined engagement in several ways. Chapman (2002) noted that early studies of student engagement focused on time-on-task behaviors and students as partners. Skinner and Belmont (1993) focused on subtler cognitive, behavioral, and affective indicators of student engagement, finding that engaged students showed continued behavioral participation and confidence in learning activities (as cited in Chapman, 2002; Hirsch, Ennis, & Driver, 2018). Skinner and Belmont studied children who selected assignments at the edge of their abilities, initiated deeds when given the prospect, and exercised passionate effort and attentiveness in the application of learning tasks. Students generally showed optimistic sentiments during ongoing action, including enthusiasm, optimism, and interest (Chapman, 2002; Hirsch et al., 2018). Pintrich and De Groot (1990) extended the perspective of engagement associated with student cognition levels to metacognitive and self-regulatory strategies that guided their learning processes. The researchers noted engagement by identifying the cognitive strategies that students used, such as the ability to persevere despite obstacles.

Bakker, Schaufeli, Leiter, and Taris (2008) described the theory of engagement for adults as a "positive, fulfilling, effective motivational state of work-related well-being that is characterized by vigor, dedication, and absorption" (p. 187). Researchers have discussed this definition of engagement to clarify its elements. Individuals with vigor showed high levels of drive and mental pliability while working, readiness to get

involved in a teacher's work, and perseverance, even in the face of snags. Dedicated individuals stayed focused, became deeply involved in personal work, and experienced a sense of significance, enthusiasm, inspiration, pride, and challenge. Individuals with the absorption factor displayed full concentration and stayed happily engrossed in work; time passed quickly, and they found it difficult to detach themselves from work. Absorption also indicated a more persistent and pervasive affective-cognitive state not focused on a particular object, event, individual, or behavior. Engagement, a positive experience in itself, was a concept relative to well-being, good health, and positive work affect (Abeysekera & Dawson, 2014).

For successful academic performance, educators first need student engagement. The student should feel positive, effective, and motivated with the environment, teacher, and peers. When students engaged in this way, their productivity increased.

Specific Theories of Student Engagement

Over the two decades previous to this study, educators have put more importance on the idea of assessing how much students learned, improved, or grew in school as well as how they ranked at graduation. Cited as the definitive study of how students developed over their college years, Astin (1984) examined how college educators could enhance student outcomes. The use of a large sample comprised of more than 20,000 students, 25,000 faculty members, and 200 institutions lent validity and reliability to the study. Astin was among the first to show how student peer groups, faculty, and academic programs affect student experiences and engagement levels.

As a follow-up to the work of Astin (1984), Kuh (1999) examined the outcomes and student efforts of educationally purposeful activities at different points and tracked

the quality of undergraduates' college experience. The researcher considered motivation and its relationship to behavioral, social, and cognitive traits as a form of engagement theory. Examining motivational concepts related to student attitudes and beliefs as well as responses to expectations of parents, peers, or faculty, Kuh discovered that motivational concepts affected general education outcomes.

Matthews et al. (2018), Sinatra et al. (2015), and Thompson and Serra (2005) have identified problems with the theory of student engagement similar to the concerns with education theory. Despite scholars who have described the measures and methods of data analysis and representation of systemic assessment of curricular and pedagogical contributions to general education learning objectives, multiple schools of thought on education theory and student engagement theory remain (Matthews et al., 2018; Sinatra et al., 2015; Thompson & Serra, 2005). The overall challenge, according to Schneider and Humphreys (2005), is that most people did not fully understand the purpose of a liberal arts education; accordingly, clear cut, universal goals were missing in the dialogue, such as how to motivate adult learners (Matthews et al., 2018; Sinatra et al., 2015).

Dixon, Yssel, McConnell, and Hardin (2014) described DI as the primary approach educators could use to assist in recognizing learners' weaknesses and strengths. Under this paradigm, teachers approach learning with a foundational effort to recognize learners' diversity based on the learning environment and the strengths and weaknesses of individual students (Shernoff et al., 2016). When using DI in classrooms with diverse students, a teacher makes the necessary adjustments in processes, instructions, and contents. Adjusting to meet students' needs requires teachers to differentiate the student

learning environment, curriculum, assessment, instruction, and leadership (Tomlinson, 2015).

Despite the perception of DI as one of the most crucial aspects of learning, teachers using this instructional method have encountered drawbacks in middle school learning. When implementing DI, U.S. middle school teachers may face various obstacles in the accomplishment of academic learning goals (Acevedo, 2013; Shernoff et al., 2016). Because teachers were responsible for the necessary implementations, researchers believed the outcome of such an occurrence put pressure on the teachers. Teachers need to use innovative, research-based teaching techniques to help students overcome challenges (Shernoff et al., 2016).

High school teachers successfully used DI to instill new learning methods that fostered better learning outcomes. Research by Abbas and Abdurrahman (2015), Pannell (2016), and Joseph, Thomas, Simonette, and Ramsook (2013) indicated improved high school academic performance for high school students whose teachers used ID compared with other approaches to learning. While gains were main in various subjects, it was specifically noticed in mathematics and science. Using DI produces positive cognitive developments among high school students, a factor that further indicates academic success (Bal, 2016).

Many schools have accepted DI as a fundamental teaching approach because of studies indicating positive cognitive improvement among students (Goddard, Goddard, Kim, & Miller, 2015; Little, McCoach, & Reis, 2014). Educators perceive that DI helped improve the teaching process for middle school students, as the approach allows teachers to accommodate various learning styles based on student capability levels. Further

clarifying the concept of DI, Hogan (2014) conducted an observation of middle school learning and incorporation of DI in the learning process concerning the zone of proximal development theory. Vygotsky (1978) defined the zone of proximal development as the difference between what learners could do without help versus what they can do with help. Data analysis indicated a need to understand the teachers' perceptions of assimilating DI in the teaching processes.

Mooney and Tomlinson (2013) suggested that the overall implementation of DI in middle school-level teaching could produce either success or failure due to the instructor's choice of teaching strategies. When teachers observed regression in middle-level student learning during DI implementation, instructors made necessary alterations that coincided with the students' learning abilities and the available teaching materials. Incorporating the same mode of action into DI strategies included low preparation, high impact strategies that helped meet individual students' needs (Morgan, 2013). An explanation of the preparation process and assimilation of DI methods in middle school levels rests on the finding that DI-enhanced instructions promoted the students' learning the process and prepared students for advanced learning.

Hackenberg, Creager, and Lee (2016) attested to the importance of DI in elevating middle school students' performance. Teachers who used DI examined curriculum demands and implementation of the methods of instruction used in the classroom. These teachers developed reflective questioning, asking students about their standards, unit goals, and interests and talents, among other elements. Furthermore, teachers who used DI considered how students would receive the information they needed to study, as well as how students would transfer their acquired knowledge to

independent learning. Hackenberg et al. (2016) suggested that teachers who used scaffolded learning and provided student opportunities for reflection saw successful learning among students in middle school. In addition, Hackenberg et al. suggested the reflective process enhanced students' abilities to acquire and retain instructions. Another finding by Hackenberg et al. was that independent learning enabled students to conduct individual studies as they progressed to high school and college. As a result, independent and reflective students became more autonomous, self-regulated learners.

Teachers can use DI as a powerful tool in multiple learning environments to enhance student engagement. DI may be a means for instructors to address the challenges of diversity, second language learning, and learning difficulties. Moreover, teachers who use DI may inspire greater degrees of self-determination among students, which could also increase student engagement.

Autonomy and Self-Determination

Middle school learners have complex and varied motivations that differ from learner to learner. Learners require autonomy and self-regulation as components of intrinsic motivation to acquire learner control and metacognition. In accordance with self-determination theory (SDT), adolescents need motivation to make decisions without interference or external influence. SDT enables the study of individual behavior focused on self-motivation and self-determination.

Researchers have emphasized the importance of autonomy in SDT (Ryan & Deci, 2000; Wadsworth, Daly, & Foote, 2018). Humans need to satisfy autonomy, competence, and relatedness to become more self-determined (Dörnyei, 2001; Wadsworth et al., 2018). Researchers postulated that, due to a fundamental need for a sense of competence,

humans strive for challenging activities to experience optimal stimulation, which they found motivating (Ryan & Deci, 2000; Wadsworth et al., 2018). Scientists argued that humans maintain intrinsic motivation when they feel competent and self-determined (Wigfield & Eccles, 2002; Wadsworth et al., 2018). Individuals either proactively regulate their behavior by controlling social and environmental factors or act in reactive ways that allow external factors to control them (Wadsworth et al., 2018).

According to SDT, extrinsic and intrinsic motivation affect the whole person simultaneously. SDT shows that intrinsic motivation and different degrees of extrinsic motivation affect an individual's degree of self-determination, which, in turn, affects self-regulation. For example, learners with intrinsic motivations willingly complete a given task because they believe the task to be interesting or desire a sense of achievement. Extrinsically motivated learners engage in a task to obtain a reward or to avoid punishment if they did not complete the task. Researchers (Deci, Vallerand, Pelletier, & Ryan, 1991; Yu et al., 2018) have hypothesized that a continuum of levels of motivation exists between purely intrinsic and purely extrinsic.

Types of regulation vary based on different degrees of extrinsic motivation: integrated, identified, introjected, and external. The more learners internalized these four types of regulations, the closer they were to achieving intrinsic motivation enabling them to act with autonomy. Classroom teachers who encouraged learners to take responsibility for their learning, offered students educational options, and allowed student involvement in the decision-making process promoted students' sense of self-determination (Deci et al., & Ryan, 1991; Yu et al., 2018).

Educational psychology researchers (Dörnyei, 2001; Yu et al., 2018). have found fostering autonomy to be a vital aspect of successful learning. Individuals with autonomy used effective learning strategies, exhibited greater self-regulation, and desired active involvement in learning tasks. Accordingly, teachers who promote learner autonomy inspire learners (Dörnyei, 2001; Yu et al., 2018). Autonomy and self-regulation have similar definitions. Self-regulation, viewed from the social cognitive perspective, is the learners' proactive or reactive processes of regulating their course of learning cognitively, motivationally, and behaviorally. Autonomy, as indicated by Littlewood (1996), is a capacity learners develop or possess that permits them to take responsibility for what and how they learned.

Autonomy and self-regulation also differ in several ways. First, individuals implement self-regulation in several phases: forethought, performance or volitional control, and self-reflection (Yu et al., 2018; Zimmerman, 2002; Zimmermann & Schunk, 1989). Autonomy is also multidimensional. Although various behaviors indicate the presence of autonomy, researchers have provided minimal evidence to indicate that autonomy consists of a specific combination of behaviors (Benson, 2013; Yu et al., 2018). The second difference indicates a measurement problem regarding autonomy. Having autonomy, therefore, does not guarantee a learner is autonomous (Yu et al., 2018). Holec (1988) is quoted by Teng (2018):

> The autonomous learner is not automatically obliged to self-direct his learning either totally or even partially. The learner will make use of his ability to do this only if he so wishes and if he is permitted to do so by the material, social and psychological constraints to which he is subjected. (Teng, 2018, p. 3)

Some researchers view autonomy as a conceptualization, a capacity that includes ability and willingness (Littlewood, 1996; Núñez & León, 2015). Learners with willingness displayed motivation, confidence, and a desire to take responsibility for making choices. Interpreting Littlewood's (1996) perspective, Benson (2001) postulated the interdependence of willingness and ability. The more ability learners had, the more confidence they displayed. Littlewood's revision of the concept of autonomy was an improvement on Holec's (1988) conceptualization of autonomy. Littlewood presented similar results to the construct of self-regulation as reliant on motivation and self-efficacy.

Learners who act with autonomy require learner choice. By selecting learning content, learners controlled autonomy; this was not the case with self-regulation (Benson, 2013; Núñez & León, 2015). Teachers who discuss self-regulated learning in classroom contexts provide tasks based on course material.

The last difference between autonomy and self-regulation pertains to the teachability of self-regulation and autonomy. Teachers or peers can demonstrate or teach self-regulation strategies to learners; however, teachers can only foster autonomy in learners. Autonomous learners can engage in distinctly different behaviors without employing a fixed set of behaviors (Benson, 2013; Núñez & León, 2015).

The research of Benson (2001) and (Núñez & León (2015) shows similarities between autonomy and self-regulation, but the traits differ in at least four respects. These differences do not indicate the superiority of one concept over the other, however, with these concepts formulated, adopted, and applied as important factors in different fields, especially within educational psychology. For example, researchers emphasized the

importance of autonomy in language learning, suggesting a need for exploration into autonomy in language learning. In addition, researchers have expressed doubts that a questionnaire can validly measure autonomy and self-regulation (Benson, 2013; Núñez & León, 2015).

A questionnaire is a good means to measure participant self-regulation and the behaviors it comprises; however, there is little evidence to indicate a particular combination of behaviors results in autonomy (Benson, 2013). To measure autonomy, researchers need to observe student behaviors, something not possible with the administration of a questionnaire. In contrast, researchers conducting quantitative studies could use a valid and reliable self-reported instrument, such as the Motivated Strategies for Learning Questionnaire (Núñez & León, 2015; Yu et al., 2018), to measure self-regulation strategies. Structured interviews and observations would also be appropriate for such research (Núñez & León, 2015; Pintrich & Groot, 1990; Yu et al., 2018). Partly based on SDT, the Motivated Strategies for Learning Questionnaire enables measurement of motivational variables closely related to autonomy and self-regulation, such as intrinsic goal orientation, extrinsic goal orientation, and self-efficacy.

Autonomy and self-determination depend, in part, on student engagement and sound educational instruction, as facilitated by teachers who used DI. When teachers allowed students autonomy and self-determination, students' productivity increased. Autonomy and self-determination do not have to occur simultaneously, however, as some students accustomed to the traditional pedagogical practice of teacher-led classrooms may not embrace the ideas at first. When they do, though, they learn to take responsibility for their learning.

Perception of Students

Before researchers can consider implementing DI for assimilation and adjustments in middle school levels, they need to understand the social perceptions of learners. According to Rodas (2016), society collectively views middle school students as individuals at an isolated stage in life characterized by awkwardness. However, Zimmermann and Iwanski (2014) disputed this social perception and stated that middle school students were not isolated; instead, they belonged to a category of increased cognitive abilities. Zimmerman and Iwanski suggested that middle school students have a wide range of cognitive, emotional, social, and intellectual capabilities. Based on their developing areas of cognitive, social, emotional, and intellectual capabilities, middle school students are at the appropriate age and level of need for teachers to implement DI into overall learning improvements (Zimmermann & Iwanski, 2014).

Pannell (2016) suggests a specialized middle school learning program may positively impact student learning; accordingly, teachers commonly adjust middle school-level learning by implementing DI, For example, Pannell (2016) argued that a specialized program incorporating DI is appropriate for the middle school learner, allowing a teacher to improve the educational environment (Pannell, 2016). Gregory, Allen, Mikami, Hafen, and Pianta (2013) have found that middle schoolers understood and benefitted from learning if teachers incorporated DI. To explore how other age groups performed with the use of DI in the classroom, the researchers posed the question of how middle-level teaching differed from elementary and high school teaching. Data showed that middle-level teachers different from instructors in elementary or secondary schools. This disparity stemmed from the range of students and student needs faced by middle-level

instructors. Teachers working at this level require specific and extensive training to ensure they can handle adolescent behaviors.

Further analysis of the difference between middle-level teachers and those at the elementary or high school levels showed a need for sensitivity when responding to students' issues (Rimm-Kaufman et al., 2014). Students at the middle school level require attentive teachers who listen. Data analysis showed that middle school teachers worked in a developmentally appropriate fashion and responded to students' needs (Rimm-Kaufman et al., 2014), thus indicating DI to be the best teaching tactic.

Although differentiating the teaching-learning instruction enhanced students' progress, teachers still need to understand the uniqueness of their students before implementing DI to achieve learning goals. Borja, Soto, and Sanchez (2015) found the classroom setting underwent an evolution characterized by students with different social-cultural backgrounds. Consequently, schools often incorrectly identified students as having learning disabilities rather than recognize their unique needs within the classroom. Borja et al. suggested that implementing DI provided teachers the opportunity to accommodate factors such as content, process, and productivity within their curricula, thus giving them ample time to address students' educational needs. Furthermore, understanding the diversity of the students helped the teacher to incorporate various strategies and differentiate instructions to address each student's needs (Borja et al., 2015).

Thakur (2014) also presented DI as the best strategy to incorporate inclusion in the modern classroom. In education, inclusion entails the provision of equal learning experiences as well as opportunities for all students. Students outside of mainstream

society (e.g., those with special education, behavioral, emotional, or psychological needs or other disabilities) require particular focus (Thakur, 2014).

School systems have a tendency for teachers to follow the model of medicalizing special education students instead of focusing on inclusion. The term *medicalization* defines a practice by which nonmedical problems become demarcated as medical problems, usually in terms of disease or disorder (Conrad, 1992; Lavin, 2016). Medicalizing disability meant perceiving students diagnosed with a disability who performed poorly in school as having a biological malady that needed specific ameliorative interventions. Researchers identified this view of disability as pathology based on a positivistic philosophical, medical model ideology. Accordingly, a positivist or functionalist ideological framework is pervasive in the history of special education in the United States. Functionalism presents social reality as objective and rational, with human problems deemed pathological (Lavin, 2016).

This problematic ideology led to the opinion that disability was a pathology or disease; accordingly, society viewed disabled persons as inherently abnormal. The concept delineates between disabled students and those who perform adequately or above average, with the latter considered nondisabled, (i.e., normal). Nonnormative, then, were students labeled as having cognitive disabilities that were only evident in the context of school, thus fostering an environment of segregation within schools. Educational institutions saw these students as requiring educational experiences dissimilar from their peers, thus applying a medical model framework to the highly social context of education and teaching.

Most teachers know that every student possesses unique skills and educational needs. Nature and nurture affect students' skills. Special education students may present certain skill sets depending on the type of special needs; likewise, an individual may show particular proficiency depending on social, cultural, or economic background. Gardner (1983) proposed the theory of multiple intelligences and not seeing intelligence as a single general ability. According to Gardner (2011), theory of multiple intelligences, every child learns differently. As a result, teachers should match their educational strategies to both the motivation and capabilities of the learners (Lavin, 2016). Adelman and Taylor (1999) stated that the model of matching instructions to learners' needs should involve both remediation and regular instructions. They also suggested teachers need to improve their abilities to personalize instructions. Remediation is an approach best used for students who may need additional assistance. Educators can implement remediation with a hierarchical framework. More significantly, some researchers observed that teachers should strive for the least intervention needed for the learners and focus on learners' motivation. Furthermore, the benefits of the remediation technique implemented by the educator should outweigh the costs (Taylor & Adelman, 1999).

PL94-142, also known as the Individuals with Disabilities Education Act (IDEA) was adopted in 1975. Under IDEA, once kids are found to have a qualifying disability, schools must provide them with special education and related services (like speech therapy and counseling) to meet their unique needs. The passage of this law provided for free appropriate education to each child with a disability (U.S. Department of Education, Office of Special Education Programs, 2007).

Given that most educators prioritized inclusion as an international education policy, DI became a practical strategy that teachers could use to address inclusion requirements in schools. The U.S. government promoted the greater inclusion of all students through classroom teaching and modeling with more emphasis on DI (Goddard et al., 2015; Joseph et al., 2013). In light of this, Thakur (2014) explained that teachers who used DI accommodated individual student learning styles as well as instructional preferences. Tedesco (2013) expressed similar sentiments, attesting that implementation of DI should coincide with inclusive education, especially in high school classrooms containing students with diversified and varying learning abilities did not indicate differences. Borja et al. (2015), as both studies presented teachers' need to recognize and accommodate students with varying and diverse learning capabilities.

Tomlinson and Moon (2013) argued that the teacher's role in implementing DI went far beyond recognition and accommodation. Rather, Tomlinson et al. found teachers and educators needed to have a sound understanding of the roles of curriculum design, instructional planning, and assessment in achieving student success. Teachers who implement quality classroom practices plan for student engagement, authentic learning opportunities, emphasize sense-making, and articulate learning goals (Tomlinson et al., 2015). Similarly, Gentry, Sallie, and Sanders (2013) suggested that differentiation strategies in a quality classroom include the identification of students' readiness levels, the application of collaboration and readiness in learning, and the integration of teaching and practice in a way that enhances learning. According to Tomlinson et al., supporting the broad range of learners found in the then-current culturally and academically diverse

classrooms requires teachers to pay close attention to critical intersections between formative assessment and instructional planning.

In some regions such as the Caribbean, many teachers claimed they had successfully assimilated DI within the classroom (Joseph et al., 2013). This integration is especially important given the cultural differences in the majority of students in these regions. Joseph (2013) found, however, that teachers did not fully comprehend what DI entailed. Among the 379 participants, only 58% understood the concepts within differentiated classrooms (Joseph et al., 2013). Accordingly, 42% of the study's participants lacked an emphasis on sensemaking, clear articulation of learning goals, and a sound understanding of curriculum assessment and design (Joseph et al., 2013).

Joseph et al. (2013) suggested reasons for the unsuccessful DI implementation, including difficulties in differentiating content and product in classrooms; challenges in the implementation of DI, such as a lack of time to plan adequate teaching and limited space for group work; and a lack of administrative support. Teachers supported by the school administration successfully introduced and exposed students to DI (Joseph et al., 2013). In addition, teachers required the introduction of and exposure to DI during their education at teacher preparation institutions. Successfully implementing DI led to better student outcomes, as teachers achieved their projected learning goals (Joseph et al., 2013).

Importance of Differential Instruction

Gentry et al. (2013) suggested that educators not underestimate the importance of DI in classrooms. DI incorporates successful teaching practices that produce students with higher senses of self-efficacy, engagement, and passion for learning. The key to

success for teachers, therefore, rests on this tactic and its availability in the classroom setting. Data indicate that teachers effectively use DI to achieve learning goals and elicit positive learning outcomes in the classroom.

In a study of undergraduate students pursuing curriculum studies at tertiary institutions, Subban and Round (2015) assigned half of the 432 participants to DI instruction and half to the whole-class instructional approach. Researchers used data from an end-of-course assessment to evaluate students' general understanding of the course. Findings showed that 90% of the participants who received the DI approach reported higher levels of intellectual growth, improved interest in the subject, and a sound understanding of the major concepts. Subban and Round confirmed these findings, as students in the differentiated group had higher grades than their counterparts in the whole-class instructional approach.

High school teachers utilizing DI strategies to teach geometry have a higher level of student achievement. Abbas and Abdurrahman (2015) used a geometric achievement test to measure the outcomes for DI students. Findings showed that the group of students that had received differentiated lessons had higher test scores than the group receiving the lecture method on how to solve geometric problems by rote learning and memorization (Abbas & Abdurrahman, 2015).

In a similar study, Muthomi and Mbugua (2014) found DI was the best approach to teaching mathematics to high school students. Of 374 participating high school students, students taught using DI performed better in mathematics than students taught with the conventional instructional approach. Accordingly, Muthomi and Mbugua

concluded that DI implementation resulted in better achievement in this subject, findings that matched previous studies.

Mulder (2014) sought to determine how much DI implementation impacted students' mathematics achievement. Following a study of primary school students, Mulder found no statistically significant effect of DI implementation on student mathematics achievement. Despite this finding, DI and mathematics achievement still had a positive relationship (Mulder, 2014). This data showed that the more a teacher differentiated within the classroom setting, the higher the mathematics achievement of the students (Mulder, 2014). Hackenberg et al. (2016) stated that implementation of DI in middle school mathematics classrooms was lacking; therefore, investigating DI at this level merited additional study to produce credible evidence of its worth.

Pannell (2016) also investigated the influence of DI on high school students' performance in science subjects. The researcher selected 48 students in a chemistry classroom to determine the influence of DI on their levels of performance in chemistry, the levels of their self-confidence, and the teachers' level of performance. Rojo discovered that DI implementation had a positive impact on student achievement: Students scored higher on chemistry assessments, received higher formative scores, and enjoyed high confidence levels. Students subjected to DI had a high percentage of homework completion and submitted high-quality lab reports. Teacher participants in this study stated that they believed that using DI in their classrooms ultimately made them better teachers (Rojo, 2014). This study, however, indicated a peculiar flaw in the use of DI within the classroom, as teachers struggled to match the pace of stipulated curriculum guides while implementing DI. As a result, teachers implemented DI for only a portion of

the course to cover all the required chapters within the school year. If teachers did implement DI, the teachers did not complete certain chapters, a fact that may have affected students' performance on examinations (Rojo, 2014).

In a similar study, Osuafor and Okigbo (2013) found biology teachers successfully implemented DI in their classrooms, with their 67 students having higher end-of-course test scores than students not subjected to DI. Robinson, Maldonado, and Whaley (2014) found that teachers came to prefer DI and strove to incorporate the technique in every classroom. In this case study, Robinson et al. employed the theoretical frameworks of constructivism and multiple intelligences to demonstrate that students must connect their learning to previous experiences to maintain their learning methods. Although the researchers did not specify which subjects DI implementation affected, they suggested that teachers at all levels of education used the technique. The findings of this study indicated that DI implementation enhanced teachers' abilities to meet the diverse needs of learners.

The importance of DI in classrooms is apparent from this range of research. When students freely engaged the material in their own way and at their own speed and learning style, they were more open to exploring. In addition, DI implementation provides the students and teachers with more freedom to interact. This greater level of freedom gave way to greater levels of interaction that, in turn, meant more learning opportunities.

Preservice Training Around Instruction to Diverse Learner Classrooms

Various mandates serve as parameters for education and teaching. Federal regulations such as the No Child Left Behind Act, Individuals with Disability Act, and Every Child Succeeds Act require teachers to be highly qualified through teacher

preparation programs and professional development to effectively teach a child based on that child's needs (Valiandes, 2015). Schools need an understanding of teachers' preparation and how well prepared they are as they begin teaching to influence their students' lives, including improved performance and achievement. Pannell (2016) argued that schools should make DI implementation mandatory, finding it to be more of a continuum that helped the students learn.

Pannell (2016) found the best strategy for preservice training was the traditional model. In the debate, the researchers conducted studies that showed that teachers obtained their qualifications from a traditional four-year degree program outperformed their counterparts (Pannell, 2016). Three pathways for preservice training have been researched, consisting of graduate, undergraduate, and alternative licensure programs. Rickenbrode (2018) claimed nearly 80% of undergraduate teaching programs outperform average graduate teaching programs. Dallas Independent School System found that it took two to three years for uncertified TFA teachers to perform about as well as teachers from traditional teaching programs. Before the 2- to 3-year period, they are generally outperformed by their counterparts (Dallas ISD, 2010). A second study by the U.S. Department of Education found that TFA teachers placed in secondary schools had a slight advantage over their comparison teachers. Although students in the study from both comparison teachers and TFA candidates both scored below the state and national average in the case study, there was a slight advantage with TFA candidates average was in the 30th percentile while the counterpart teachers had a student average in the 27th percentile. The majority of studies found were in the area of traditional programs, and most research to support TFA was not peer-reviewed (Clark et al., 2014).

Teachers who went through preservice training increased their competencies and learned how to implement individualized programs that matched grade-level standards (Ward, 2015) and addressed individual student needs. For example, teachers need to understand that special program students, like gifted students, benefit substantially from the differentiation programs. Teachers that acquired beneficial knowledge on DI through a preservice training program were subsequently able to implement DI strategies to meet students' needs in the classroom. Otherwise, teachers in programs that failed to provide preservice teacher candidates with skills to implement DI strategies experienced difficulties in making the necessary curriculum adjustments. A critical assessment of this issue showed that teachers who implemented DI created a favorable learning environment for students. In such an environment, teachers could predict a situation, making the necessary adjustments for the students (Subban & Round, 2015).

Meyers-Wagner (2015) claimed that teachers needed to use collaboration methods to make the planning process successful. Particularly, collaboration presented teachers with time-saving benefits and gave novice teachers the chance to understand others from a foundational approach that included planning and shared experience. Although universities with preservice teaching programs emphasize improving undergraduate preservice teaching programs, less emphasis is placed on improving Master's preservice teaching programs. This finding may indicate that undergraduate teaching programs may be of higher quality than Master's-level programs (Meyers-Wagner, 2015).

Cho, Caleon, and Kapur (2015) found beginning teachers with more life experience could analyze concepts based on foundational theories and make sound decisions, something the researchers attributed to an ability to utilize diverse resources to

locate supporting evidence. Students in Master's-level classes utilized a diverse array of primary resources and had the ability to establish arguments based on theoretical ideas and personal experiences. Teacher candidates with more experience were capable of applying theories to personal experiences, suggesting an ability to propose ideas that depicted real-life experiences, whether their own experiences or the experiences of their future students. Teachers with more life experience found had deeper and more complex skills (Cho et al., 2015).

Lockley, Jackson, Downing, and Roberts (2017) studied teacher experience concerning preservice preparation regarding DI. The researchers described teacher preparation courses addressing DI, either consciously or unconsciously. However, they also found a majority of DI strategies taught using a traditional nondifferentiated approach. Thus, Lockley et al. suggested that university instructors should model the differentiation when providing instruction in their classrooms, thereby customizing the learning experience to the preservice candidates.

Nag (2017) discussed that teachers with Master's degrees could more efficiently design curriculum, provide mentoring, and evaluate different levels of students. Employers believed that teachers with Master's degrees had more teaching experience in their preservice preparation than their counterparts with undergraduate degrees, especially as teachers with Master's held both advanced and undergraduate degrees. Master's degree programs provided would-be teachers with a broader variety of sources and knowledge as they navigated through the laborious, challenging process of preservice preparation (Nag, 2017).

In an examination of preservice teacher candidates' sources and levels of knowledge about autism spectrum disorder, found teachers' preservice preparation programs have an effect on students. Thus, preservice teachers were able to determine student outcomes based on their preservice training on effective interventions. Students' level of understanding depended on the levels of knowledge the teacher had from preservice programs (Blackwell, Sheppard, Lehr, & Huang, 2017).

To determine the effectiveness of the preservice teacher candidates at the study site, three instruments were used to assess candidates in this study. The three instruments were the LEES, MEES, and MoPTA.

LEES is a survey expected of all Lindenwood teacher candidates upon graduation from an undergraduate or graduate program for preservice teachers (Personal Communication, B. Kania-Gosche, November 2, 2017). The LEES is taken by all graduates of the university, both graduate and undergraduate, from the university's college of education. The survey provides data to the university on the candidates' perceived preparation in multiple areas of teaching and learning. Questions vary from teacher preparedness for addressing learning difficulties, implementing state standards, and motivating students. For the purpose of this study, questions were selected that were related to DI.

The MEES is a collection of assessments formative in nature and leads to continuous improvement. The assessments are aligned to standards that reflect excellence. They build a culture of informing practice and promoting learning; and use multiple, balanced measurements that are fair and ethical (MODESE, 2016b). This instrument evaluated students in areas ranging from effective communication, school and

classroom culture, and using assessment to improve learning. For the purpose of this study, standards were selected for analysis based on their connection to DI.

The MoPTA is an evidence-based performance assessment designed to assess the instructional capability of pre-service teachers prior to receiving teaching license. This assessment evaluates teacher candidates on their ability to have an impact on student learning as stated in the Missouri Teacher Standards and Quality Indicators (MODESE, 2017).

For the purpose of this study, DI will be defined as "an instructional practice that promotes varied and adapted approaches to teaching based on the individual student versus the classroom as a whole (Tomlinson, 2001, as cited by MODESE, 2014). Tomlinson has identified the following themes of DI: assessment, learning environment, curriculum, leadership, and instruction. "Through DI, teachers modify their curriculum for their students versus the students having to change to fit the curriculum" (Tomlinson, 2001, as cited by MODESE, 2014).

For the purpose of this study, the researcher identified five elements that would be used in the analysis of qualitative data. The areas were curriculum, instruction, leadership, environment, and assessment. These five elements were identified by Tomlinson and Moon (2013).

Early work of Tomlinson focused on the areas of differentiation of content, process, and product. The idea that student assignments and learning could be differentiated in at least two of these areas. McCarthy (2015) states Carol Tomlinson first introduced these concepts to provide teachers a way to differentiate in a powerful way for all learners (McCarthy, 2014). In Tomlinson's (2001) book *How to Differentiate in Mixed*

Ability Classroom, each of these ideas of content, process, and product are described. Content is the skills, concepts, and knowledge students need to learn. Content can be differentiated by differentiating the process of learning or the product students complete. Process is how schools deliver content or how students make sense of the content they are receiving through the curriculum. Process can be differentiated by the content being delivered or the product students complete. Product is the end result or body of work students complete to show mastery. The product can be differentiated by the content students need to master or the process at which students explore to reach their final product. Later work by Tomlinson and Moon (2013) included a fourth element that would be Affect/Environment. This was defined as the climate or tone of the classroom (Tomlinson & Moon 2013)

Tomlinson also discusses the need to differentiate using what we know about the learner. Tomlinson states that differentiation can also take place by using what we know about each student or group of students. Educators must consider learner readiness, learning profiles, and learner interests. McCarthy (2014), when discussing Readiness, states instruction should begin where the student's skill level begins. Interest is defined as "that which engages the attention, curiosity, and involvement of a student" (Imbeau & Tomlinson, 2010, p. 16). This provides the idea when students or someone is excited or interested in a topic, or concept, they will be more likely to achieve when it used as a vehicle for learning. A student's learning profile is "a preference for taking in, exploring, or expressing content" (Imbeau & Tomlinson, 2010, p. 17) Much of this thinking can be tied to Garners Multiple Intelligence and how students have preferred learning modes.

Summary

In this chapter, the literature review began with an explanation of factors that improve student learning. The researcher identified key components to support the study and reviewed literature in these areas. The researcher reviewed literature on DI, student engagement, and then both general and specific themes on student engagement. The researcher reviewed literature on autonomy, self-determination, and the perception of students on learning. Finally, the researcher reviewed literature on the importance of DI and how preservice training guides instruction to diverse learner classrooms.

Chapter Three: Methodology

Introduction

The study of preservice teachers' preparation for DI contributes to the growing body of evidence on the preservice experience and an increase in highly qualified teacher candidates by focusing on DI teaching of secondary level students.

Purpose

The purpose of this mixed-methods study was to compare undergraduate and graduate data for evidence of DI knowledge in lesson planning and implementation using the MoPTA, the IMEES for pre-service teachers for the state of Missouri (MEES), the Exit Survey for pre-service teachers for the Research University that is the research site (LEES), and artifacts (lesson plans) from MoPTA. Specifically, the researcher investigated whether teacher candidates who participate in the graduate and undergraduate programs have congruent or different knowledge and implementation levels. Through this comparison, the study addresses the level to which preservice teacher candidates are prepared to plan and use DI, and whether that differs by education level (undergraduate or graduate).

In order to compare the planning and implementation of DI strategies of the undergraduate and graduate teacher education programs, the researcher investigated specific items from LEES surveys, MoPTA scores, and MEES evaluations. The researcher compared the quantitative data collected through Lindenwood University on these instruments. In addition, the researcher analyzed qualitative data from open responses to MoPTA. By completing quantitative and qualitative analyses of these two identified groups, the study provides feedback regarding an undergraduate teacher

education program versus a graduate program in planning and implementing DI lessons during their clinical experience.

Research Questions and Hypotheses

The overarching research question guiding this study was, what is the difference, if any, in teacher candidates' knowledge and application of differentiated instruction in planning lessons, based upon enrollment in Masters of Arts teacher training programs versus enrollment in the Bachelor of Arts teacher training programs?

Three specific questions were addressed:

RQ1: To what extent do the undergraduate and graduate-level teacher educator programs at one Research University equally prepare teacher candidates to use differentiated instruction in their classrooms as a beginning teacher?

The null hypotheses related to this question are:

$H_0 1_{\text{-LEES}}$: On the LEES, the scores of undergraduate preservice teachers will not differ from that of graduate preservice teachers.

$H_0 1_{\text{-MEES}}$: On the MEES, the scores of undergraduate preservice teachers will not differ from that of graduate preservice teachers.

$H_0 1_{\text{-MoPTA}}$: On the MoPTA, the scores of undergraduate preservice teachers will not differ from that of graduate preservice teachers.

RQ2: To what extent do the results of the LEES, MEES, and MoPTA differ when analyzed by education level (graduate/undergraduate)?

The null hypotheses related to this question are:

$H_0 2_{-U}$: When comparing results across measures for undergraduate preservice teachers, the results comparisons for LEES to MEES, MEES to MoPTA, and LEES to MoPTA will not differ.

$H_0 2_{-U}$: When comparing results across measures for graduate preservice teachers, the results comparisons for LEES to MEES, MEES to MoPTA, and LEES to MoPTA will not differ.

RQ3: When comparing qualitative and quantitative results by area of differentiated instruction (leadership, curriculum, instruction, learning environment, and assessment), to what extent will the results differ and/or be correlated within each area?

The null hypothesis related to this question is:

$H_0 3_{-U}$: When compared by DI area, the results for qualitative and quantitative measures will not differ nor have a moderate or stronger amount of correlation.

Validity of Study

The research design addressed multiple areas of internal and external validity for this study: historical, maturation, instrumentation, and population. A threat to internal validity addressed was historical. As discussed in Chapter Two, Rickenbrode (2018) claimed nearly eighty percent of undergraduate teaching programs outperform average graduate teaching programs. This threat was addressed by identifying the participants' education level (graduate or undergraduate) and looking at their work separately. Maturation was partially controlled by ensuring all participants took the same three instruments at the same time in their teaching program and the same year. There were no internal threats of validity in the area of testing because the data was all secondary and randomly selected and provided to the researcher after participants' preservice program

was complete and testing was completed. Instrumentation threats to validity were controlled by having all instruments scored by either the same university for the LEES or the same state agency for the MEES and MoPTA. MoPTA artifact scoring in the principles of DI for purposes of this study was conducted by the researcher who has in-depth training in DI and a colleague who was trained under the researcher.

There was an external threat to validity identified in the area of population. It was mediated by the researcher through the use of one population from one university in which all participants took the same test. The second aspect of population validity is that two of the three testing instruments were specific to a midwestern state and are not tools used outside of this state. These threats to external validity create many limits to the generalizability beyond the researched university.

Research Site

The Research University used for this study was founded in 1827 and served as a four-year institution. The campus was in an urban area outside of a major metropolitan area. The location of the university was in a city of approximately sixty-five thousand residents. The University offered 131 degree programs and was accredited by the Higher Learning Commission. The University had two campuses located approximately 40 miles apart in two different states, at the time of this writing.

The student-to-faculty ratio was 12:1 with students from 47 states and 70 foreign countries. The enrollment on the main campus consisted of 6,491 undergraduate students and 2,891 graduate students. The satellite campus had 4,105 undergraduate students with 2,022 graduate students.

The population at the research site included approximately 741 first-time freshmen from a variety of races and cultures, with 56% identifying as female and 44% identifying as male. The student population at the university consisted of 13% international students and 87% United States residents. Of the U.S. residents, 73% were from the Midwest, 7% were from the South, 5% were from the West, 1% were from the Northeast, and 0.1% were unknown. U.S. residents identified as American Indian or Alaskan (1%), Asian or Pacific Islander (1%), African American (8%), Caucasian (67%), Hispanic or Latino (5%), or multiethnic (2%), while 4% did not identify their ethnicity.

Population Sampling

The researcher received IRB approval through the Institutional Review Board of the Research University of study, with a university partner who was the associate dean of the School of Education and a professor of education at the Research University. The university partner provided the necessary data to conduct this study. Specifically, the provided data were for the MEES, LEES, and MoPTA.

All three assessments are used in the process for a preservice teaching candidate to receive certification and were conducted during or at the end of their clinical experience. The MEES, LEES, and MoPTA all provided quantitative data for this study, while only the MoPTA provided qualitative data for this study. MoPTA was a collection of artifacts provided by the teaching candidate and their supervisors to the state of Missouri for consideration of certification. The MEES was a collection of observations with more immediate feedback to preservice teaching candidates. LEES was a survey administered at the end of the clinical experience. Also, the MEES was used in consideration for teacher certification. The LEES focused on knowledge, while the

MoPTA focused on application of the knowledge gained from the preservice teaching program.

The Research University partner provided MEES, LEES, and MoPTA results from a random sample of participants taking each assessment during the 2015–2016 and 2016–2017 academic school years. A Research University official was responsible for random sampling and de-identifying test results.

Upon receipt of the data, the researcher discovered that the digital files provided had corrupted partitions, making the material unusable in its current form. Shortly afterward, the providing partner left employment at the Research University, leaving the university unable to find the original copy of the deidentified data. The researcher solicited the services of a data recovery specialist to remove the corrupted partitions and restore the files to a usable format. All work occurred on the researcher's computer to prevent any transfer or sharing of the data.

All recovered files resided on a password-protected computer accessible only by the researcher. Corrected data partitions arrived in an Excel file with three tabs: MEES, LEES, and MoPTA. The researcher labeled tables in alignment with the appropriate instrument. With all instruments appropriately identified, the researcher worked collaboratively with a committee member to align columns for spreadsheets. The initial corruption on the files required data realignment on all spreadsheets. After aligning the columns for LEES, MEES, and MoPTA, the researcher reordered columns (see Appendix A) to align the headings of each column with the appropriate data in the spreadsheet. The result of this alignment provided the researcher with a usable data set.

In the random data sets, there were 38 data sets on the LEES, 47 data sets on the MEES, and 43 data sets on the MoPTA. Of these data sets, 32 were identified as having results on all three of the testing instruments. Identification of the 32 participants with results for all three measures resulted in a new data sample with complete information on the MEES, LEES, and MoPTA, allowing for cross test analysis by participant. Analysis of the final data set for 32 participants was conducted using descriptive statistics, statistical significance, and correlational statistics. The researcher analyzed the matched data set of the final group of 32 participants to minimize the skewing of results and to obtain more valid results.

Research Participants

The matched data set had 32 participants, including 14 undergraduate and 18 graduate students from the same Research University. All participants completed the three testing instruments, with their scores provided for the study. Participant disaggregation by race appears in Table 1.

Table 1

Participant Demographics

Participants	White/Caucasian	Black/African American	Did not identify
Undergraduate	10	1	3
Graduate	14	3	1
Total	24	4	4

Instruments

Educational Testing Services (ETS), in collaboration with the Missouri Department of Elementary and Secondary Education (MODESE), developed MoPTA to assess knowledge and classroom capabilities in preservice teachers in the state of Missouri. MoPTA was a performance-based assessment used by MODESE to guide

candidates through their clinical experiences and to assess the instructional capability of the teacher candidates prior to licensure. The intent with MoPTA was to provide a deeper and more complete view of a teacher candidate's performance and growth throughout the student teaching experience, subsequently promoting reflective practice and encouraging collaboration between teacher candidates, supervising instructors, and cooperating teachers. Aligned with Missouri Teacher Standards and Quality Indicators, MoPTA was a means to develop more effective teachers in the classroom by identifying strengths and areas for improvement of practice (MODESE, 2016a).

Hundreds of educators across the state of Missouri developed MEES, with subsequent refinement to meet the needs statewide. The framework of this assessment was a theory of action, which stated that improving student performance was predicated on the improvement of educator practice. Foundational assumptions included that evaluation processes are formative and that evaluation processes "(a) lead to continuous improvement; (b) are aligned to standards that reflect excellence; (c) build a culture of informing practice and promoting learning; and (d) use multiple, balanced measurements that are fair and ethical" (MODESE, 2019, p. 1). Beginning in fall 2018, the MEES for Teacher Candidates became the required performance assessment for student teachers across the state. This assessment afforded teacher candidates the opportunity to put preparation into practice (MODESE, 2019, p. 1).

In an interview, Dr. Suzanne Hull (personal communication, June 4, 2020), former director of MODESE Teacher Certification, stated that the MEES was a more valid tool for assessing teacher preparedness in the state than the MoPTA, when compared to first-year teacher surveys completed by their principals and first-year

teacher surveys. Dr. Hull expressed concerns that there was no immediate feedback for preservice teaching candidates taking the MoPTA, since results were not given until completion of the preservice teaching opportunity (personal communication, June 4, 2020). The MEES, in contrast, provided an opportunity for discussion between observers and preservice teaching candidates throughout the preservice teaching placements and provided time for student reflection and improvement. MODESE did not continue with the MoPTA after the 2016-2017 academic year, instead using only the MEES for teaching certification in the state of Missouri. Dr. Hull stated that the MEES was developed in its current state, at the time of this study, by having all 43 teacher preparation programs in the state of Missouri identify seven participants who evaluated the language of the MEES rubric for preservice teachers. Dr. Hull indicated that this process of development increased the validity of this testing instrument. (personal communication, June 7, 2020),

LEES was a tool from the Research University, collecting data to ensure the university was properly preparing teaching candidates for entering the profession. The survey included specific questions aligned to the MEES on preservice teacher preparation. LEES was an instrument developed by the college of education used by the Research University to determine readiness of both graduate preservice and undergraduate preservice teachers as they entered the field of teaching (personal communication, Kania-Gosche, B., September 11, 2017). LEES was an internal instrument by the university and was not reported to the state governing body.

Procedure for Preparing Data

Data preparation involved a variety of steps. These steps have been separated into two lists, those taken for quantitative data and those taken with qualitative data. Steps 1 and 2 were previously discussed in this chapter. The other steps follow the outline below.

Quantitative Data Preparation:

1. Obtaining the scored data from university partner
2. Recovery and reorganization of digital data that was corrupted
3. Selection of data set for statistical analysis.
4. Development of equivalent scales across instruments.
5. Conversion of scores to the equivalent scales for analysis.
6. Selection of items by DI principles from testing instruments.

Data Selection

The researcher cross-referenced all three testing instruments to obtain the maximum set of participant data. What resulted was a matched participant data set with complete data for each participant who had taken and received a score for the LEES, MEES, and MoPTA assessments. Participants who lacked data for all assessments were not included in order to decrease skewing of results in a small sample size and increase validity by using the same participants across the instruments when conducting analysis, using descriptive statistics, statistical significance, and correlational statistics. In order to determine whether a participant was a graduate preservice teaching candidate or graduate preservice teaching candidate, responses from the LEES and MoPTA data were useful to identify the degree pursued by each participant, whether undergraduate or graduate. The

MEES did not ask the participant to identify themselves as an undergraduate or graduate preservice teaching candidate.

Creating Equivalence Among Instruments

Coding of all instrument data to prepare for statistical analysis took place using an equivalent scale developed by the researcher to provide equivalent scales across instruments (see Table 2; for the complete table, see Appendix B). The researcher used the LEES categorical levels as the primary structure for creating the equivalence. The categorical levels for the LEES were 3 = *very well prepared*, 2 = *well prepared*, 1 = *adequately prepared*, 0 = *inadequately prepared*, and did not have a designation for missing. The researcher wanted to differentiate between low scores on work performed versus work that was missing, so the scale was adjusted. The new scale was 4 = *very well prepared*, 3 = *well prepared*, 2 = *adequately prepared*, 1 = *inadequately prepared*, and 0 = *missing*. Each of the other instruments had descriptive levels to identify the same type of category. The use of formulas was a means to determine cumulative points, with totals averaged for each participant for each instrument, to obtain an overall equivalent score.

Table 2

Equivalent Scale for Testing Instruments

	Equivalent scale descriptors	LEES descriptors	MEES descriptors	MoPTA descriptors
	Preparation level	Preparation level	Developmental stage	Evidence level
4	Very well	Very well	Developing	Consistent
3	Well prepared	Well prepared	Emerging 2 (Consistent)	Effective
2	Adequately	Adequately prepared	Emerging 1 (Inconsistent)	Partial
1	Inadequately	Inadequately	Baseline	Minimal
0	Missing	Missing	Missing	Missing

Selection of Items by DI Principles from Testing Instruments

Selection of items from all three testing instruments was made based on whether they assessed a DI principle or not. If they did assess a DI principle, they were placed in a table for analysis. After determining the categories for items, they were reviewed by a committee member. Some items were placed in multiple categories due to items assessing more than one category. This was especially prevalent in curriculum and instruction (see Appendix C).

Qualitative Data Preparation

Obtaining the artifacts from university partner

1. Recovery and reorganization of digital data that was corrupted
2. Identify the folders of artifacts for the 32 participants.
3. Develop rubric for scoring artifacts.
4. Trained colleague on application of rubric.
5. Artifacts were scored by researcher and a colleague.
6. Checked interrater reliability.
7. Included scoring data as the qualitative data for statistical testing.

The rubric for evaluating the artifacts was developed by the researcher to score artifacts based on the five principles of DI. All artifacts would be scored in all five areas on the same scale used for the quantitative data analysis. The scale would score all items with 4 = *very well prepared*, 3 = *well prepared*, 2 = *adequately prepared*, 1 = *inadequately prepared*, or 0 = *missing*. Once the rubric was developed, the evaluator scored several artifacts from excluded participants and trained the colleague on using the tool. The researcher and the colleague scored each artifact independently and met to

discuss after scoring was completed. Scores from each rater were then correlated using the Pearson Correlation Coefficient formula to check interrater reliability. Interrater reliability was acceptable in all five areas. Due to correlation in the strong range in four out of the five areas of DI, and the remaining one in the moderate range, both scores were considered valid to create an overall qualitative score by averaging the two scores. The researcher matched quantitative assessment data to qualitative data assessment, based on the five principles of DI.

The researcher took all three testing instruments and identified the items in each instrument that were paired with the principle of DI. The researcher averaged the score in each area by individual. The researcher then compared the average of two scores from the researcher and colleague on the specific principles to the average score of the quantitative data.

Statistical Testing

Excel's Descriptive Statistics tool, part of the Excel Data Analysis package, enabled statistical analysis. The random sample data sets underwent analysis to obtain descriptive statistics, including mean, median, mode, standard deviation, sample variance, range, minimum, maximum, and count for each instrument. After determining descriptive statistics for all the participants in each data set came the computation of descriptive statistics by education level. Finally, the researcher ran descriptive statistics for each instrument for the whole group, the graduate participants, and the undergraduate participants. The descriptive statistics were mean, median, mode, standard deviation, sample variance, range, minimum, maximum, and count

To ensure the validity of comparing participants across measures, the researcher removed all participants who failed to complete one or more of the LEES, MEES, or MoPTA assessments. Items that were not identified as having a relationship with DI for statistical data analysis were not part of the working copy of data but retained on original data.

Upon completion of the descriptive statistics was the computation of Pearson's Product-Moment Correlation Coefficient analysis on the whole group, the graduate participants, and the undergraduate participants comparing MEES, LEES, and MoPTA for undergraduate participants to graduate participants. Also computed were correlations between LEES to MoPTA scores, LEES to MEES scores, and MEES to MoPTA scores.

Summary

In Chapter Three, the researcher provided the problem statement of the study, along with the purpose of the study. Research questions and the Hypotheses were restated prior to discussing the method of the study. The validity of the study was discussed, as well as the research site, population sampling, and research participants. The researcher identified the instruments and the procedures for preparing data. The researcher explained the data selection for matched sets and how the study created equivalence among instruments. The chapter ends with statistical testing and what would be done with qualitative and quantitative data.

Chapter Four: Analysis

Introduction

The purpose of this study was to determine if DI has a relationship with the overall teaching and learning practices of secondary preservice teacher candidates. The study also included an examination of preservice training among the teacher candidates who generated the data set for this study. Finally, this study presented a comparison of Master of Arts in Teaching programs to Bachelor of Arts in Teaching programs to determine which produced better-trained preservice teacher candidates in terms of DI knowledge and planning.

Research Questions and Hypotheses

The overarching research question that guided this study was, what is the difference, if any, in teacher candidates' knowledge and application of differentiated instruction in planning lessons, based upon enrollment in Masters of Arts teacher training programs versus enrollment in the Bachelor of Arts teacher training programs?

Three specific questions were addressed:

RQ1: To what extent do the undergraduate and graduate-level teacher educator programs at one Research University equally prepare teacher candidates to use differentiated instruction in their classrooms as a beginning teacher?

The null hypotheses related to this question were:

$H_0 1_{\text{-LEES}}$: On the LEES, the scores of undergraduate preservice teachers will not differ from that of graduate preservice teachers.

$H_0 1_{\text{-MEES}}$: On the MEES, the scores of undergraduate preservice teachers will not differ from that of graduate preservice teachers.

$H_0 1_{\text{-MoPTA}}$: On the MoPTA, the scores of undergraduate preservice teachers will not differ from that of graduate preservice teachers.

RQ2: To what extent do the results of the LEES, MEES, and MoPTA differ when analyzed by education level (graduate/undergraduate)?

The null hypotheses related to this question were:

$H_0 2_{\text{-U}}$: When comparing results across measures for undergraduate preservice teachers, the results comparisons for LEES to MEES, MEES to MoPTA, and LEES to MoPTA will not differ.

$H_0 2_{\text{-U}}$: When comparing results across measures for graduate preservice teachers, the results comparisons for LEES to MEES, MEES to MoPTA, and LEES to MoPTA will not differ.

RQ3: When comparing qualitative and quantitative results by area of differentiated instruction (leadership, curriculum, instruction, learning environment, and assessment), to what extent will the results differ and/or be correlated within each area?

The null hypothesis related to this question is:

$H_0 3_{\text{-U}}$: When compared by DI area, the results for qualitative and quantitative measures will not differ nor have a moderate or stronger amount of correlation.

Statistical Tests

Statistical tests used for analysis were descriptive statistics, statistical tests of significance and, correlation. Qualitative data were coded using a rubric-based process developed by the researcher (see Appendix D), before statistical analysis.

Results

Quantitative descriptive statistics. MEES participants had a mean score of 3.54, a median score of 3.68, and a mode of 4.00. The minimum score received by a participant was 0.0 and the maximum score was 3.0, providing a range of 3.0. The maximum and minimum scores a participant could receive were 4.0 and 0.0, respectively (see Table 3).

Table 3

MEES Whole Group Descriptive Statistics

Statistical analysis	Finding
Mean	3.54
Median	3.68
Mode	4.00
Standard deviation	0.70
Sample variance	0.49
Range	4.00
Minimum	0.00
Maximum	4.00
Count	32.00

Table 4

LEES Whole Group Descriptive Statistics

Statistical analysis	Finding
Mean	3.34
Median	3.47
Mode	4.00
Standard deviation	0.57
Sample variance	0.32
Range	2.13
Minimum	1.87
Maximum	4.00
Count	32.00

LEES participants had a mean score of 3.34, a median score of 3.47, and a mode of 4.00. The minimum score received by a participant was 1.87 and the maximum score

was 4.0, providing a range of 2.13. The maximum and minimum scores a participant could receive were 4.0 and 0.0, respectively (see Table 4).

MoPTA participants had a mean score of 2.60, a median score of 2.78, and a mode of 2.78. The minimum score received by a participant was 1.44 and the maximum score was 3.08, providing a range of 1.64. The maximum and minimum scores a participant could receive were 4.0 and 0.0, respectively (see Table 5).

Table 5

MoPTA Whole Group Descriptive Statistics

Statistical analysis	Finding
Mean	2.60
Median	2.78
Mode	2.78
Standard deviation	0.41
Sample variance	0.17
Range	1.64
Minimum	1.44
Maximum	3.08
Count	32.00

Table 6

MEES Undergraduate Descriptive Statistics

Statistical analysis	Finding
Mean	3.61
Median	3.68
Mode	4.00
Standard deviation	0.32
Sample variance	0.10
Range	1.19
Minimum	2.81
Maximum	4.00
Count	14.00

MEES undergraduate participants had a mean score of 3.61, a median score of 3.68, and a mode of 3.00. The minimum score received by a participant was 2.81 and the

maximum score was 4.0, providing a range of 1.19. The maximum and minimum scores a participant could receive were 4.0 and 0.0, respectively (see Table 6).

LEES undergraduate participants had a mean score of 3.53, a median score of 3.53, and a mode of 3.00. The minimum score received by a participant was 3.0 and the maximum score was 4.0, providing a range of 1.0. The maximum and minimum scores a participant could receive were 4.0 and 0.0, respectively (see Table 7).

Table 7

LEES Undergraduate Descriptive Statistics

Statistical analysis	Finding
Mean	3.53
Median	3.53
Mode	3.00
Standard deviation	0.33
Sample variance	0.11
Range	1.00
Minimum	3.00
Maximum	4.00
Count	14.00

MoPTA undergraduate participants had a mean score of 2.66, a median score of 2.79, and a mode of 2.78. The minimum score received by a participant was 1.70 and the maximum score was 3.08, providing a range of 1.34. The maximum and minimum scores a participant could receive were 4.0 and 0.0, respectively (see Table 8).

Table 8

MoPTA Undergraduate Descriptive Statistics

Statistical analysis	Finding
Mean	2.66
Median	2.79
Mode	2.78
Standard deviation	0.42
Sample variance	0.17
Range	1.38
Minimum	1.70
Maximum	3.08
Count	14.00

MEES graduate participants had a mean score of 3.48, a median score of 3.68, and a mode of 4.00. The minimum score received by a participant was 0.0 and the maximum score was 4.0, providing a range of 4.00. The maximum and minimum scores a participant could receive were 4.0 and 0.0, respectively (see Table 9).

Table 9

MEES Graduate Descriptive Statistics

Statistical analysis	Finding
Mean	3.48
Median	3.68
Mode	4.00
Standard deviation	0.90
Sample variance	0.82
Range	4.00
Minimum	0.00
Maximum	4.00
Count	18.00

LEES graduate participants had a mean score of 3.19, a median score of 3.17, and a mode of 4.00. The minimum score received by a participant was 1.87 and the maximum score was 4.0, providing a range of 2.13. The maximum and minimum scores a participant could receive were 4.0 and 0.0, respectively (see Table 10).

Table 10

LEES Graduate Descriptive Statistics

Statistical analysis	Finding
Mean	3.19
Median	3.17
Mode	4.00
Standard deviation	0.67
Sample variance	0.45
Range	2.13
Minimum	1.87
Maximum	4.00
Count	18.00

MoPTA graduate participants had a mean score of 2.56, a median score of 2.65, and a mode of 2.79. The minimum score received by a participant was 1.44 and the maximum score was 3.03, providing a range of 1.58. The maximum and minimum scores a participant could receive were 4.0 and 0.0, respectively (see Table 11).

Table 11

MoPTA Graduate Descriptive Statistics

Statistical analysis	Finding
Mean	2.56
Median	2.65
Mode	2.79
Standard deviation	0.42
Sample variance	0.18
Range	1.58
Minimum	1.44
Maximum	3.03
Count	18.00

F-tests. The researcher hypothesized that there is no variance between undergraduate and graduate students' scores on the LEES. The *F*-test for difference between variance for LEES undergraduate preservice candidates and LEES graduate preservice candidates yielded a test value of .25 compared to the *F*-critical value of .40.

With a *p*-value of 0.01, the null hypothesis was rejected; therefore, there is a significant difference in variance between LEES undergraduate preservice candidates and LEES graduate preservice candidates (see Table 12). This result indicated the researcher would conduct a two-sample *t*-test assuming unequal variances.

Table 12

Two Sample F-Test for Variances: LEES

Statistical analysis	Undergraduate	Graduate
Mean	3.53	3.19
Variance	0.11	0.45
Observations	14.00	18.00
df	13.00	17.00
F	0.25	
$p(F \leq f)$ one-tail	0.01	
F-critical one-tail	0.40	

The researcher hypothesized that there is no variance between undergraduate and graduate students' scores on the MEES. *F*-test for difference between variance for MEES undergraduate preservice candidates and MEES graduate preservice candidates yielded a test value of .12 compared to the *F*-critical value of .40. With a *p*-value of 0.0, the null hypothesis was rejected; therefore, there was a significant difference in variance between MEES undergraduate preservice candidates and MEES graduate preservice candidates (see Table 13). This result indicates the researcher will conduct a two-sample *t*-test assuming unequal variances.

Table 13

Two Sample F-Test for Variances: MEES

Statistical analysis	Undergraduate	Graduate
Mean	3.61	3.48
Variance	0.10	0.82
Observations	14.00	18.00
df	13.00	17.00
F	0.12	
$p(F \leq f)$ one-tail	0.00	
F-critical one-tail	0.40	

The researcher hypothesized that there is no variance between undergraduate and graduate students' scores on the MoPTA. The *F*-test for difference between variance for MoPTA undergraduate preservice candidates and MoPTA graduate preservice candidates yielded a test value of .50 compared to the *F*-critical value of .40. With a p-value of 0.50, the null hypothesis was not rejected; therefore, there is not a significant difference in variance between MoPTA undergraduate preservice candidates and MoPTA graduate preservice candidates (see Table 14). MoPTA graduate preservice candidates had a greater variance. This result indicates the researcher will conduct a two-sample *t*-test assuming equal variances.

Table 14

Two Sample F-Test for Variances: MoPTA

Statistical analysis	Undergraduate	Graduate
Mean	2.66	2.56
Variance	0.17	0.18
Observations	14.00	18.00
df	13.00	17.00
F	0.99	
$p(F \leq f)$ one-tail	0.50	
F-critical one-tail	0.40	

The researcher hypothesized that there is no variance between the preservice undergraduate teacher candidate scores on the LEES and MEES. The *F*-test for

difference in variance for LEES undergraduate preservice candidates and MEES undergraduate preservice candidates yielded a test value of 1.11, compared to the *F*-critical value of 2.58. With a *p*-value of 0.43, the null hypothesis was not rejected; therefore, there was not a significant difference in variance between LEES undergraduate preservice candidates and MEES undergraduate preservice candidates (see Table 15). This result indicates the researcher will conduct a two-sample *t*-test assuming equal variances.

Table 15

Two Sample F-Test for Variances: LEES–MEES Undergraduate

Statistical analysis	LEES	MEES
Mean	3.53	3.61
Variance	0.11	0.10
Observations	14.00	14.00
df	13.00	13.00
F	1.11	
$p(F \leq f)$ one-tail	0.43	
F-critical one-tail	2.58	

The researcher hypothesized that there is no variance between the preservice undergraduate teacher candidate scores on the MEES and MoPTA. The *F*-test for difference in variance for MEES undergraduate preservice candidates and MoPTA undergraduate preservice candidates yielded a test value of .58 compared to the *F*-critical value of .39. With a *p*-value of 0.17, the null hypothesis was not rejected; therefore, there is not a significant difference in variance between MEES undergraduate preservice candidates and MoPTA undergraduate preservice candidates (see Table 16). Graduate preservice candidates had a greater variance. MEES Undergraduate preservice candidates had a greater variance. This result indicates the researcher will conduct a two-sample *t*-test assuming equal variances.

Table 16

Two Sample F-Test for Variances: MEES–MoPTA Undergraduate

Statistical analysis	MEES	MoPTA
Mean	3.61	2.66
Variance	0.10	0.17
Observations	14.00	14.00
df	13.00	13.00
F	0.58	
$p(F \leq f)$ one-tail	0.17	
F-critical one-tail	0.39	

The researcher hypothesized that there is no variance between the preservice undergraduate teacher candidate scores on the MoPTA and LEES. The *F*-test for difference in variance for MoPTA undergraduate preservice candidates and LEES undergraduate preservice candidates yielded a test value of 1.56, compared to the *F*-critical value of 2.58. With a *p*-value of 0.22, the null hypothesis was not rejected; therefore, there was not a difference in variance between MoPTA undergraduate preservice candidates and LEES undergraduate preservice candidates (see Table 17). This result indicates the researcher will conduct a two-sample *t*-test assuming equal variances.

Table 17

Two Sample F-Test for Variances: MoPTA–LEES Undergraduate

Statistical analysis	MoPTA	LEES
Mean	2.66	3.53
Variance	0.17	0.11
Observations	14.00	14.00
df	13.00	13.00
F	1.56	
$p(F \leq f)$ one-tail	0.22	
F-critical one-tail	2.58	

The researcher hypothesized that there is no variance between the preservice graduate teacher candidate scores on the LEES and MEES. The *F*-test for difference in variance for LEES graduate preservice candidates and MEES graduate preservice

candidates yielded a test value of .55, compared to the *F*-critical value of .44. With a *p*-value of 0.12, the null hypothesis was not rejected; therefore, there is not a difference in variance between LEES graduate preservice candidates and MEES graduate preservice candidates (see Table 18). MEES graduate preservice candidates had a greater variance. This result indicates the researcher will conduct a two-sample *t*-test assuming equal variances.

Table 18

Two Sample F-Test for Variances: LEES-MEES Graduate

Statistical analysis	LEES	MEES
Mean	3.19	3.48
Variance	0.45	0.82
Observations	18.00	18.00
df	17.00	17.00
F	0.55	
$p(F \leq f)$ one-tail	0.12	
F-critical one-tail	0.44	

The researcher hypothesized that there is no variance between the preservice graduate teacher candidate scores on the MEES and MoPTA. The *F*-test for difference in variance for MEES graduate preservice candidates and MoPTA graduate preservice candidates yielded a test value of 4.64 compared to the *F*-critical value of 2.27. With a *p*-value of 0.00, the null hypothesis was rejected; therefore, there was a significant difference in variance between MEES graduate preservice candidates and MoPTA graduate preservice candidates (see Table 19). MEES graduate preservice candidates had a greater variance. This result indicates the researcher will conduct a two-sample *t*-test assuming unequal variances.

Table 19

Two Sample F-Test for Variances: MEES–MoPTA Graduate

Statistical analysis	MEES	MoPTA
Mean	3.48	2.56
Variance	0.82	0.18
Observations	18.00	18.00
df	17.00	17.00
F	4.64	
$p(F \leq f)$ one-tail	0.00	
F-critical one-tail	2.27	

The researcher hypothesized that there is no variance between the preservice graduate teacher candidate scores on the MoPTA and LEES. The *F*-test for difference in variance for MoPTA graduate preservice candidates and LEES graduate preservice candidates yielded a test value of .39, compared to the *F*-critical value of .44. With a *p*-value of 0.03, the null hypothesis was rejected; therefore, there is a significant difference in variance between MoPTA graduate preservice candidates and LEES graduate preservice candidates (see Table 20). This result indicates the researcher will conduct a two-sample *t*-test assuming unequal variances.

Table 20

Two Sample F-Test for Variances: MoPTA–LEES Graduate

Statistical analysis	MoPTA	LEES
Mean	2.56	3.19
Variance	0.18	0.45
Observations	18.00	18.00
df	17.00	17.00
F	0.39	
$p(F \leq f)$ one-tail	0.03	
F-critical one-tail	0.44	

The researcher hypothesized that there is no difference between the entire sample group, preservice graduate and preservice undergraduate teacher candidates, scores on the LEES and MEES. The *F*-test for difference in variance for whole group LEES preservice

candidates and whole group MEES preservice candidates yielded a test value of .66 compared to the *F*-critical value of .55. With a *p*-value of 0.12, the null hypothesis was not rejected; therefore, there is not a significant difference in variance between whole group LEES preservice candidates and whole group MEES preservice candidates (see Table 21). MEES whole group had a greater variance. This result indicates the researcher will conduct a two-sample *t*-test assuming equal variances.

Table 21

Two Sample F-Test for Variances: LEES–MEES Whole Group

Statistical analysis	LEES	MEES
Mean	3.34	3.54
Variance	0.32	0.49
Observations	32.00	32.00
df	31.00	31.00
F	0.66	
$p(F \leq f)$ one-tail	0.12	
F-critical one-tail	0.55	

The researcher hypothesized that there is no difference between the entire sample group, preservice graduate and preservice undergraduate teacher candidates, scores on the MEES and MoPTA. The F-test for difference in variance for whole group MEES preservice candidates and whole group MoPTA preservice candidates yielded a test value of 2.88, compared to the *F*-critical value of 1.82. With a *p*-value of 0.00, the null hypothesis was rejected; therefore, there is a significant difference in variance between whole group MEES preservice candidates and whole group MoPTA preservice candidates (see Table 22). MEES whole group preservice candidates had a greater variance. This result indicates the researcher will conduct a two-sample *t*-test assuming unequal variances.

Table 22

Two Sample F-Test for Variances: MEES–MoPTA Whole Group

Statistical analysis	MEES	MoPTA
Mean	3.54	2.60
Variance	0.49	0.17
Observations	32.00	32.00
df	31.00	31.00
F	2.88	
$p(F \leq f)$ one-tail	0.00	
F-critical one-tail	1.82	

The researcher hypothesized that there is no difference between the entire sample group, preservice graduate and preservice undergraduate teacher candidates, scores on the MoPTA and LEES. The *F*-test for difference in variance for whole group MoPTA preservice candidates and whole group LEES preservice candidates yielded a test value of .053 compared to the *F*-critical value of .55. With a *p*-value of 0.04, the null hypothesis was rejected; therefore, there is a significant difference in variance between whole group MoPTA preservice candidates and whole group LEES preservice candidates (see Table 23). This result indicates the researcher will conduct a two-sample *t*-test assuming unequal variances.

Table 23

Two Sample F-Test for Variances: MoPTA–LEES Whole Group

Statistical analysis	MoPTA	LEES
Mean	2.60	3.34
Variance	0.17	0.32
Observations	32.00	32.00
df	31.00	31.00
F	0.53	
$p(F \leq f)$ one-tail	0.04	
F-critical one-tail	0.55	

T-tests. The researcher hypothesized that there is no difference between undergraduate and graduate students' scores on the LEES. The *t*-test for difference in

means for LEES undergraduate preservice candidates and LEES graduate preservice candidates yielded a test value of 1.89, compared to the *t*-critical value of 2.06. With a *p*-value of 0.07, the null hypothesis was not rejected; therefore, there is no significant difference in means between LEES undergraduate preservice candidates and LEES graduate preservice candidates (see Table 24).

Table 24

Two-Sample t-Test Assuming Unequal Variances: LEES Undergraduate–Graduate

Statistical analysis	LEES undergraduate	LEES graduate
Mean	3.53	3.19
Variance	0.11	0.45
Observations	14.00	18.00
Hypothesized mean difference	0.00	
df	26.00	
t	1.89	
$p(T \leq t)$ one-tail	0.03	
t-critical one-tail	1.71	
$p(T \leq t)$ two-tail	0.07	
t-critical two-tail	2.06	

The researcher hypothesized that there is no difference between undergraduate and graduate students' scores on the MEES. The *t*-test for difference in means for MEES undergraduate preservice candidates and MEES graduate preservice candidates yielded a test value of .56 compared to the *t*-critical value of 2.07. With a *p*-value of 0.58, the null hypothesis was not rejected; therefore, there was no significant difference in means between MEES undergraduate preservice candidates and MEES graduate preservice candidates (see Table 25).

Table 25

Two-Sample t-Test Assuming Unequal Variances: MEES Undergraduate–Graduate

Statistical analysis	MEES undergraduate	MEES graduate
Mean	3.61	3.48
Variance	0.10	0.82
Observations	14.00	18.00
Hypothesized mean difference	0.00	
df	22.00	
t	0.56	
$p(T \leq t)$ one-tail	0.29	
t-critical one-tail	1.72	
$p(T \leq t)$ two-tail	0.58	
t-critical two-tail	2.07	

The researcher hypothesized that there is no difference between undergraduate and graduate students' scores on the MoPTA. The *t*-test for difference in means for MoPTA undergraduate preservice candidates and MoPTA graduate preservice candidates yielded a test value of .63 compared to the *t*-critical value of 2.04. With a *p*-value of 0.54, the null hypothesis was not rejected; therefore, there was no significant difference in means between MoPTA undergraduate preservice candidates and MoPTA graduate preservice candidates (see Table 26).

Table 26

Two-Sample t-Test Assuming Equal Variances: MoPTA Undergraduate–Graduate

Statistical analysis	MoPTA undergraduate	MoPTA graduate
Mean	2.66	2.56
Variance	0.17	0.18
Observations	14.00	18.00
Pooled variance	0.18	
Hypothesized mean difference	0.00	
df	30.00	
t	0.63	
$p(T \leq t)$ one-tail	0.27	
t-critical one-tail	1.70	
$p(T \leq t)$ two-tail	0.54	
t-critical two-tail	2.04	

The researcher hypothesized that there is no difference between undergraduate LEES and undergraduate students' scores on the MEES. The *t* -test for difference in means for LEES undergraduate preservice candidates and MEES undergraduate preservice candidates yielded a test value of -.68, compared to the *t*-critical value of 2.06. With a *p*-value of 0.50, the null hypothesis was not rejected; therefore, there was no significant difference in means between MEES undergraduate preservice candidates and MEES graduate preservice candidates (see Table 27).

Table 27

Two-Sample t-Test Assuming Equal Variances: LEES–MEES Undergraduate

Statistical analysis	LEES undergraduate	MEES undergraduate
Mean	3.53	3.61
Variance	0.11	0.10
Observations	14.00	14.00
Pooled variance	0.11	
Hypothesized mean difference	0.00	
df	26.00	
t	-0.68	
$p(T \leq t)$ one-tail	0.25	
t-critical one-tail	1.71	
$p(T \leq t)$ two-tail	0.50	
t-critical two-tail	2.06	

The researcher hypothesized that there is no difference between undergraduate MEES and undergraduate students' scores on the MoPTA. The *t*-test for difference in means for MEES undergraduate preservice candidates and MoPTA undergraduate preservice candidates yielded a test value of 6.8, compared to the *t*-critical value of 2.06. With a *p*-value of 0.00, the null hypothesis was rejected; therefore, there was a significant difference in means between MEES undergraduate preservice candidates and MoPTA undergraduate preservice candidates (see Table 28).

Table 28

Two-Sample t-Test Assuming Equal Variances: MEES–MoPTA Undergraduate

Statistical analysis	MEES undergraduate	MoPTA undergraduate
Mean	3.61	2.66
Variance	0.10	0.17
Observations	14.00	14.00
Pooled variance	0.14	
Hypothesized mean difference	0.00	
df	26.00	
t	6.81	
$p(T \leq t)$ one-tail	0.00	
t-critical one-tail	1.71	
$p(T \leq t)$ two-tail	0.00	
t-critical two-tail	2.06	

Table 29

Two-Sample t-Test Assuming Equal Variances: MoPTA–LEES Undergraduate

Statistical analysis	MoPTA undergraduate	LEES undergraduate
Mean	2.66	3.53
Variance	0.17	0.11
Observations	14.00	14.00
Pooled variance	0.14	
Hypothesized mean difference	0.00	
df	26.00	
t	-6.10	
$p(T \leq t)$ one-tail	0.00	
t-critical one-tail	1.71	
$p(T \leq t)$ two-tail	0.00	
t-critical two-tail	2.06	

The researcher hypothesized that there is no difference between undergraduate MoPTA and undergraduate students' scores on the LEES. The *t*-test for difference in means for MoPTA undergraduate preservice candidates and LEES undergraduate preservice candidates yielded a test value of -6.10 compared to the *t*-critical value of 2.06. With a *p*-value of 0.00, the null hypothesis was rejected; therefore, there was a

significant difference in means between MoPTA undergraduate preservice candidates and LEES undergraduate preservice candidates (see Table 29)

The researcher hypothesized that there is no difference between graduate LEES and graduate students' scores on the MEES. The *t*-test for difference in means for LEES graduate preservice candidates and MEES graduate preservice candidates yielded a test value of -1.13, compared to the *t*-critical value of 2.03. With a *p*-value of 0.27, the null hypothesis was not rejected; therefore, there was no significant difference in means between LEES graduate preservice candidates and MEES graduate preservice candidates (see Table 30).

Table 30

Two-Sample t-Test Assuming Equal Variances: LEES–MEES Graduate

Statistical analysis	LEES graduate	MEES graduate
Mean	3.19	3.48
Variance	0.45	0.82
Observations	18.00	18.00
Pooled variance	0.63	
Hypothesized mean difference	0.00	
df	34.00	
t	-1.13	
$p(T \leq t)$ one-tail	0.13	
t-critical one-tail	1.69	
$p(T \leq t)$ two-tail	0.27	
t-critical two-tail	2.03	

The researcher hypothesized that there is no difference between graduate MEES and graduate students' scores on the MoPTA. The t-test for difference in means for MEES graduate preservice candidates and MoPTA graduate preservice candidates yielded a test value of 3.92, compared to the *t*-critical value of 2.06. With a *p*-value of 0.00, the null hypothesis was rejected; therefore, there was a significant difference in

means between MEES graduate preservice candidates and MoPTA graduate preservice candidates (see Table 31).

Table 31

Two-Sample t-Test Assuming Unequal Variances: MEES–MoPTA Graduate

Statistical analysis	MEES graduate	MoPTA graduate
Mean	3.48	2.56
Variance	0.82	0.18
Observations	18.00	18.00
Hypothesized mean difference	0.00	
df	24.00	
t	3.92	
$p(T \leq t)$ one-tail	0.00	
t-critical one-tail	1.71	
$p(T \leq t)$ two-tail	0.00	
t-critical two-tail	2.06	

Table 32

Two-Sample t-Test Assuming Unequal Variances: MoPTA–LEES Graduate

Statistical analysis	MoPTA graduate	LEES graduate
Mean	2.56	3.19
Variance	0.18	0.45
Observations	18.00	18.00
Hypothesized mean difference	0.00	
df	29.	
t	-3.34	
$p(T \leq t)$ one-tail	0.00	
t-critical one-tail	1.70	
$p(T \leq t)$ two-tail	0.00	
t-critical two-tail	2.05	

The researcher hypothesized that there is no difference between graduate MoPTA and graduate students' scores on the LEES. The *t*-test for difference in means for MoPTA graduate preservice candidates and LEES graduate preservice candidates yielded a test value of -3.34, compared to the *t*-critical value of 2.05. With a *p*-value of 0.00, the null hypothesis was rejected; therefore, there was a significant difference in means between

MoPTA graduate preservice candidates and LEES graduate preservice candidates (see Table 32).

The researcher hypothesized that there is no difference between LEES whole group and whole group scores on the MEES. The *t*-test for difference in means for LEES whole group preservice candidates and MEES whole group preservice candidates yielded a test value of -1.28, compared to the *t*-critical value of 2.00. With a *p*-value of 0.21, the null hypothesis was not rejected; therefore, there was no significant difference in means between the scores on the LEES for the whole group of preservice candidates and the scores on the MEES for the whole group of preservice candidates (see Table 33).

Table 33

Two-Sample t-Test Assuming Equal Variances: LEES–MEES Whole Group

Statistical analysis	LEES whole group	MEES whole group
Mean	3.34	3.54
Variance	0.32	0.49
Observations	32.00	32.00
Pooled variance	0.41	
Hypothesized mean difference	0.00	
df	62.00	
t	-1.28	
$p(T \leq t)$ one-tail	0.10	
t-critical one-tail	1.67	
$p(T \leq t)$ two-tail	0.21	
t-critical two-tail	2.00	

The researcher hypothesized that there is no difference between graduate MoPTA and graduate students' scores on the LEES. The *t*-test for difference in means for MoPTA graduate preservice candidates and LEES graduate preservice candidates yielded a test value of -3.34, compared to the *t*-critical value of 2.05. With a *p*-value of 0.00, the null hypothesis was rejected; therefore, there was a significant difference in means between

MoPTA graduate preservice candidates and LEES graduate preservice candidates (see Table 32).

The researcher hypothesized that there is no difference between MEES whole group and whole group scores on the MoPTA. The *t*-test for difference in means for MEES whole group preservice candidates and MoPTA whole group preservice candidates yielded a test value of 6.49, compared to the t-critical value of 2.01. With a *p*-value of 0.00, the null hypothesis was rejected; therefore, there was significant difference in means between MEES whole group preservice candidates and MoPTA whole group preservice candidates (see Table 34).

Table 34

Two-Sample t-Test Assuming Unequal Variances: MEES–MoPTA Whole Group

Statistical analysis	MEES whole group	MoPTA whole group
Mean	3.54	2.60
Variance	0.49	0.17
Observations	32.00	32.00
Hypothesized mean difference	0.00	
df	50.00	
t	6.49	
$p(T \leq t)$ one-tail	0.00	
t-critical one-tail	1.68	
$p(T \leq t)$ two-tail	0.00	
t-critical two-tail	2.01	

The researcher hypothesized that there is no difference between MoPTA whole group and whole group scores on the LEES. The *t*-test for difference in means for MoPTA whole group preservice candidates and LEES whole group preservice candidates yielded a t-value of -5.88, compared to the *t*-critical value of 2.00. With a *p*-value of 0.00, the null hypothesis was rejected; therefore, there was a significant difference in means

between MoPTA whole group preservice candidates and LEES whole group preservice candidates (see Table 35).

Table 35

Two-Sample t-Test Assuming Unequal Variances: MoPTA–LEES Whole Group

Statistical analysis	MoPTA whole group	LEES whole group
Mean	2.60	3.34
Variance	0.17	0.32
Observations	32.00	32.00
Hypothesized mean difference	0.00	
df	57.00	
t	-5.88	
$p(T \leq t)$ one-tail	0.00	
t-critical one-tail	1.67	
$p(T \leq t)$ two-tail	0.00	
t-critical two-tail	2.00	

Pearson product-moment correlation coefficient. Running the Pearson product-moment correlation coefficient analysis entailed the use of the entire population, combining both graduate and undergraduate preservice candidates with complete data.

The researcher hypothesized that there is no relationship between combined undergraduate and graduate students' scores on the MEES and combined scores of undergraduate and graduate on the LEES. Comparing MEES to LEES resulted in r = -.15 There was an observable inverse relationship that was minimal between MEES and LEES (see Table 36).

Table 36

Pearson Product-Moment Correlation Coefficient: MEES–LEES

Assessment	MEES	LEES
MEES	1.00	
LEES	-0.15	1.00

The researcher hypothesized that there is no relationship between combined undergraduate and graduate students' scores on the LEES and combined scores of

undergraduate and graduate on the MoPTA. Comparing LEES to MoPTA resulted in an r =.40 There was a moderate positive relationship between MEES and LEES (see Table 37).

Table 37

Pearson Product-Moment Correlation Coefficient: LEES–MoPTA

Assessment	LEES	MoPTA
LEES	1.00	
MoPTA	0.40	1.00

The researcher hypothesized that there is no relationship between combined undergraduate and graduate students' scores on the MoPTA and combined scores of undergraduate and graduate on the MEES. Comparing MoPTA to MEES resulted in an r = -0.3. There was an inverse observable relationship that was minimal between MoPTA and MEES (see Table 38).

Table 38

Pearson Product-Moment Correlation Coefficient: MoPTA–MEES

Assessment	MoPTA	MEES
MoPTA	1.00	
MEES	-0.03	1.00

Running the Pearson product-moment correlation coefficient analysis for the following tests entailed the use of the population of undergraduate preservice candidates with complete data.

The researcher hypothesized that there is no relationship between MEES undergraduate and LEES undergraduate students' scores. Comparing MEES to LEES resulted in an r = -.27. There was an observable inverse relationship that was minimal between MEES and LEES (see Table 39).

Table 39

Pearson Product-Moment Correlation Coefficient: MEES–LEES Undergraduate

Assessment	MEES undergraduate	LEES undergraduate
MEES	1.00	
LEES	-0.27	1.00

The researcher hypothesized that there is no relationship between LEES undergraduate and MoPTA undergraduate students' scores. Comparing LEES to MoPTA resulted in an r =.00 There were no relationships between LEES and MoPTA (see Table 40).

Table 40

Pearson Product-Moment Correlation Coefficient: LEES–MoPTA Undergraduate

Assessment	LEES	MoPTA
LEES	1.00	
MoPTA	0.00	1.00

The researcher hypothesized that there is no relationship between MoPTA undergraduate and MEES undergraduate students' scores. Comparing MoPTA to MEES resulted in an r =.60. There was a moderate relationship between MoPTA and MEES (see Table 41).

Table 41

Pearson Product-Moment Correlation Coefficient: MoPTA–MEES Undergraduate

Assessment	MoPTA undergraduate	MEES undergraduate
MoPTA	1.00	
MEES	0.60	1.00

Running the Pearson product-moment correlation coefficient analysis for the following tests entailed the use of the population of graduate preservice candidates with complete data.

The researcher hypothesized that there is no relationship between MEES graduate and LEES graduate students' scores. Comparing MEES to LEES resulted in an r= -.17 There was an observable inverse relationship that was minimal between MEES and LEES (see Table 42).

Table 42

Pearson Product-Moment Correlation Coefficient: MEES–LEES Graduate

Assessment	MEES graduate	LEES graduate
MEES	1.00	
LEES	-0.17	1.00

The researcher hypothesized that there is no relationship between LEES graduate and MoPTA graduate students' scores. Comparing LEES to MoPTA resulted in an r = .57 There was a positive relationship that was strong between MEES and MoPTA (see Table 43).

Table 43

Pearson Product-Moment Correlation Coefficient: LEES–MoPTA Graduate

Assessment	LEES graduate	MoPTA graduate
LEES	1.00	
MoPTA	0.57	1.00

The researcher hypothesized that there is no relationship between MoPTA graduate and MEES graduate students' scores. Comparing MoPTA to MEES resulted in an r =-0.2. There was an observable minimal inverse relationship between MoPTA and MEES (see Table 44).

Table 44

Pearson Product-Moment Correlation Coefficient: MoPTA–MEES Graduate

Assessment	MoPTA graduate	MEES graduate
MoPTA	1.00	
MEES	-0.21	1.00

The researcher looked at overall scores of the MEES, LEES, and MoPTA based on strands of differentiation of assessment, leadership, instruction, curriculum, and environment. Appendix E presents the data used for this analysis. After weighing the three tests equally, the researcher assigned each individual a score. Descriptive statistics performed on these scores indicated a single score per strand, enabling determination of the level of preparedness. A histogram was also created for each strand.

Based on the overall strand score for assessment (3.29), students are prepared in the DI assessment strand. Only one individual scored below being adequately prepared in this area. Participants with a strand score of 2.01 or above are considered adequately prepared as an entry-level teacher. In this present study, 31 of 32 participants scored between 2.01 and 4.0; of these, 25 were well prepared, with a strand score of 3.01 to 4.0 (see Figure 1).

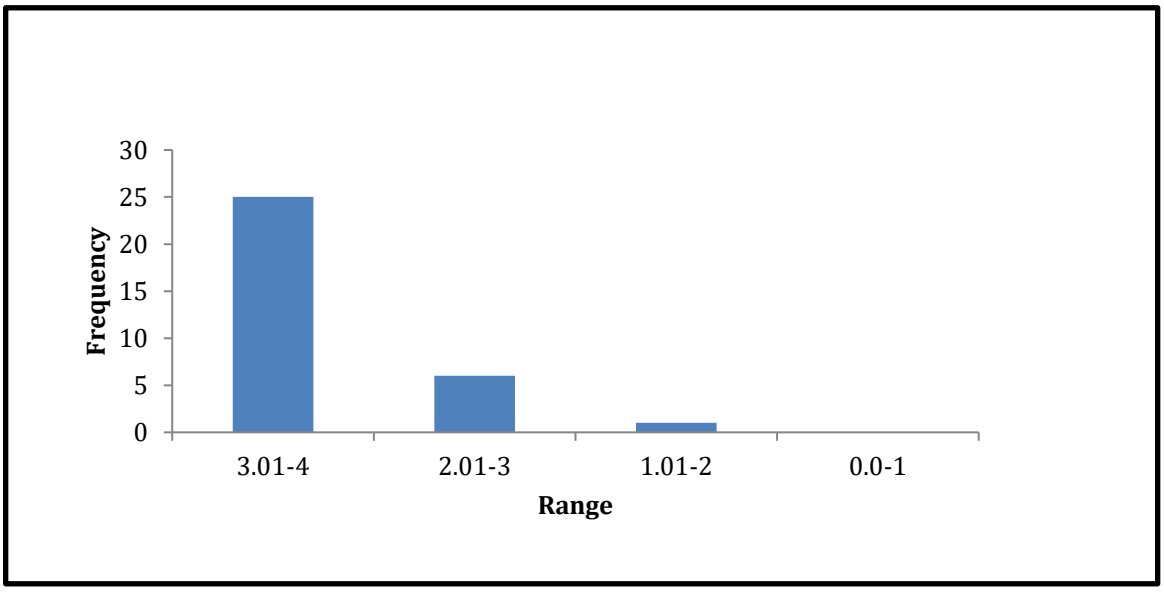

Figure 1. Histogram for assessment scores.

Based on the overall strand score for curriculum (3.21), students are prepared in the DI assessment strand. Only one person scored below being adequately prepared in this area. Participants with a strand score of 2.01 or above are considered adequately

prepared as an entry-level teacher. In the present study, 31 of 32 participants scored between 2.01 and 4.0; of these, 23 were well prepared, with a strand score of 3.01 to 4.0 (see Figure 2).

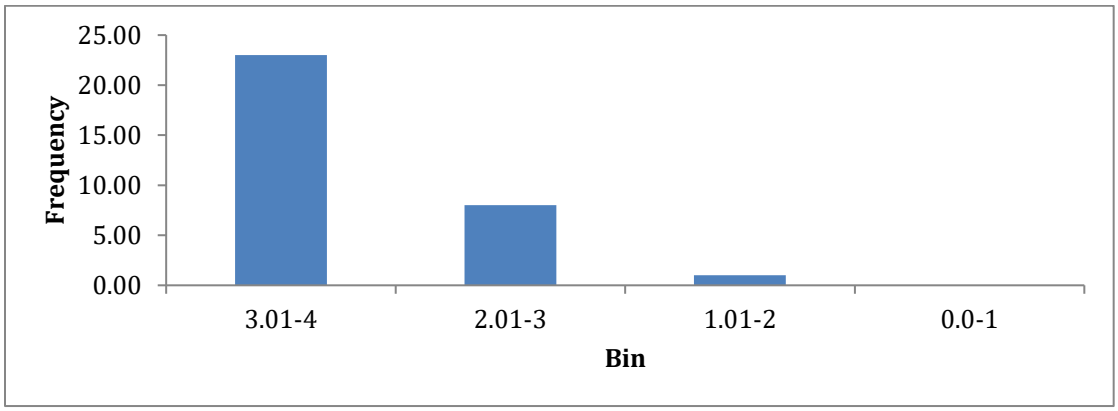

Figure 2. Histogram for curriculum scores.

Based on the overall strand score for leadership (3.21), students are prepared in the DI assessment strand. Only one person scored below being adequately prepared in this area. Participants with a strand score of 2.01 or above are considered adequately prepared as an entry-level teacher. In the present study, 31 of 32 participants scored between 2.01 and 4.0; of these, 25 are well prepared, with a strand score of 3.01 to 4.0 (see Figure 3).

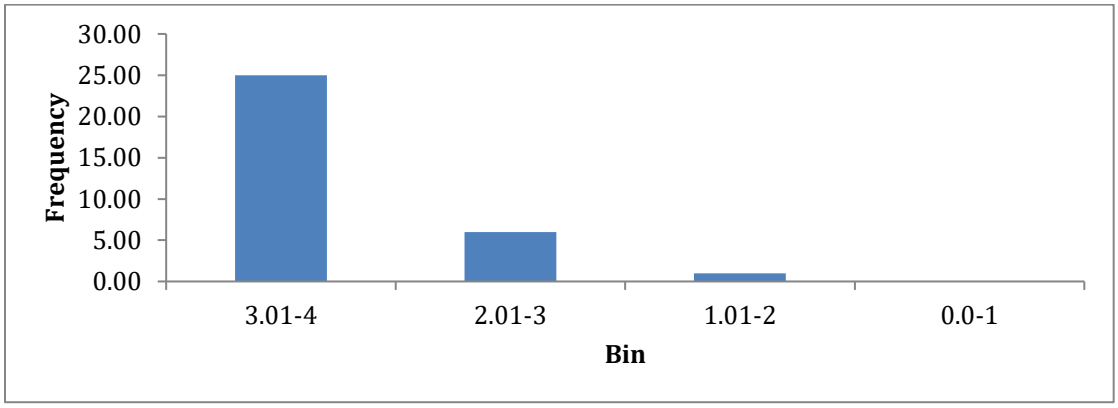

Figure 3. Histogram for leadership scores.

Based on the overall strand score for instruction (3.13), students are prepared in the DI assessment strand. Only one person scored below being adequately prepared in

this area. Participants with a strand score of 2.01 or above are considered adequately prepared as an entry-level teacher. In the present study, 31 of 32 participants scored between 2.01 and 4.0; of these, 23 were prepared, with a strand score of 3.01 to 4.0. Important to note is that, along with instruction, curriculum had the lowest number of participants scoring as well prepared (see Figure 4).

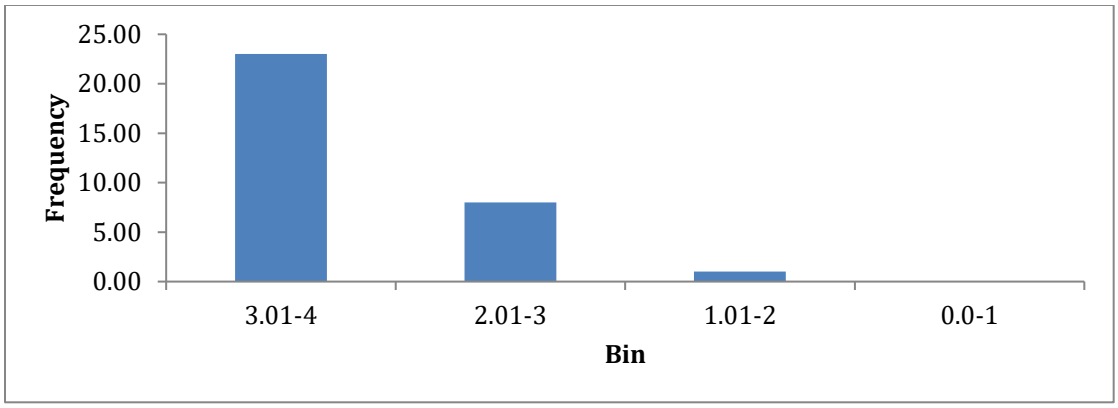

Figure 4. Histogram for instruction scores.

Based on the overall strand score for environment (3.46), students are prepared in the DI assessment strand. Only one person scored below being adequately prepared in this area. Participants with a strand score of 2.01 or above are considered adequately prepared as an entry-level teacher. In the present study, 31 of 32 participants scored between 2.01 and 4.0; of these, 29 are well prepared, with a strand score of 3.01–4.0. Environment had the largest number of participants scoring as well prepared (see Figure 5).

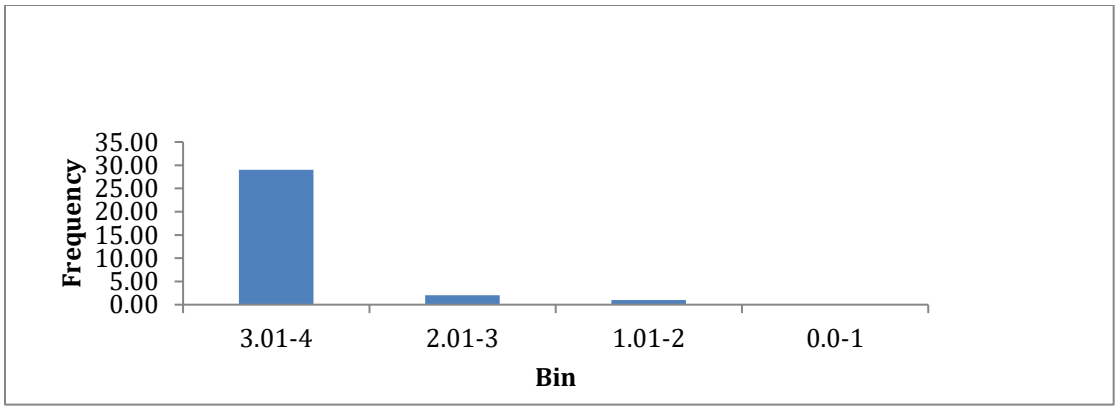

Figure 5. Histogram for environment scores.

Qualitative research. To determine opportunities for strands in the classroom, the researcher examined each category to identify differentiation in the qualitative samples provided by the university. All samples were from MoPTA artifacts provided for certification. Individual participants received scores based on their entire digital portfolio of evidence. Because participants were in different teaching situations, documentation of preservice experience varied; even so, this study was an opportunity to find evidence of differentiation.

For the qualitative research, the researcher and an additional professional scored artifacts from participants, to determine a value for each area of DI. Scores from each reviewer were compared for interrater reliability using a Pearson Correlation.

Interrater Reliability Data

The researcher hypothesized that there is no difference and no correlation between qualitative and quantitative data for each identified area of DI. Comparing Scorer 1 to Scorer 2 in the area of learning environment resulted in an *r* value of .74. The Null Hypothesis was rejected. There was a strong relationship between the scoring of Scorer 1 and Scorer 2 (see Table 45).

Table 45

Pearson Product-Moment Correlation Coefficient: Learning Environment – Interrater Reliability

	Scorer 1	Scorer 2
Scorer 1	1	
Scorer 2	0.74152008	1

The researcher hypothesized that there is no difference and no correlation between qualitative and quantitative data for each identified area of DI. Comparing Scorer 1 to Scorer 2 in the area of curriculum resulted in an r =.61. The Null Hypothesis was rejected. There was a strong positive relationship between the scoring of Scorer 1 and Scorer 2 (see Table 46).

Table 46

Pearson Product-Moment Correlation Coefficient: Curriculum – Interrater Reliability

	Scorer 1	Scorer 2
Scorer 1	1	
Scorer 2	0.61259582	1

The researcher hypothesized that there is no difference and no correlation between qualitative and quantitative data for each identified area of DI. Comparing Scorer 1 to Scorer 2 in the area of assessment resulted in an r =.65. There was a strong positive relationship between the scoring of Scorer 1 and Scorer 2 (see Table 47).

Table 47

Pearson Product-Moment Correlation Coefficient: Assessment – Interrater Reliability

	Scorer 1	Scorer 2
Scorer 1	1	
Scorer 2	0.65098678	1

The researcher hypothesized that there is no difference and no correlation between qualitative and quantitative data for each identified area of DI. Comparing Scorer 1 to Scorer 2 in the area of instruction resulted in an r =.45. The Null Hypothesis

was rejected. There was a moderate positive relationship between the scoring of Scorer 1 and Scorer 2 (see Table 48).

Table 48

Pearson Product-Moment Correlation Coefficient: Instruction – Interrater Reliability

	Scorer 1	Scorer 2
Scorer 1	1	
Scorer 2	0.4501242	1

The researcher hypothesized that there is no difference and no correlation between qualitative and quantitative data for each identified area of DI. Comparing Scorer 1 to Scorer 2 in the area of leadership resulted in an r =.52. The Null Hypothesis was rejected. There was a positive relationship that is significant between the scoring of Scorer 1 and Scorer 2 (see Table 49).

Table 49

Pearson Product-Moment Correlation Coefficient: Leadership – Interrater Reliability

	Scorer 1	Scorer 2
Scorer 1	1	
Scorer 2	0.52905983	1

The researcher performed descriptive statistical analysis on each area of DI followed by a *t*-test: paired two sample for means. This was followed by a Pearson correlation to determine the relationship between quantitative and qualitative data.

Learning Environment: Quantitative Versus Qualitative

Participants who received scores for qualitative data in the area of learning environment had a mean score of 3.56 in quantitative and 3.15 in qualitative, a median score of 3.56 in quantitative and 3 in qualitative, and a mode of 3.25 in quantitative and 3 in qualitative. The minimum score received by a participant was 3 in quantitative and 2 in qualitative, and the maximum score for quantitative was 4 and qualitative was 4,

providing a range of 1 in quantitative and 2 in qualitative. The maximum and minimum scores a participant could receive were 4.0 and 0.0, respectively (see Table 50).

Table 50

Descriptive Statistics – Learning Environment – Qualitative and Quantitative

Quantitative		Qualitative	
Mean	3.56096154	Mean	3.15384615
Median	3.5625	Median	3
Mode	3.25	Mode	3
Range	1	Range	2
Minimum	3	Minimum	2
Maximum	4	Maximum	4

The researcher hypothesized that there is no difference and no correlation between qualitative and quantitative data for learning environment from the testing instruments. The paired *t*-test sample for means for qualitative and quantitative results for learning environment yielded a *t*-value of 4.91, compared to the *t*-critical value of 2.06 and a *p*-value of 0.00 and an *r*-value of .55, which indicates a strong relationship. The null hypothesis was rejected; therefore, there is a significant difference in means between qualitative and quantitative data for learning environment from the testing instruments with average quantitative scores being higher than the average qualitative scores (see Table 51).

Table 51

t-Test Paired Two Sample for Means – Learning Environment – Qualitative and Quantitative

	Quantitative	Qualitative
Mean	3.56096154	3.15384615
Variance	0.09895737	0.25538462
Observations	26	26
Pearson correlation	0.55216846	
Hypothesized mean difference	0	
df	25	
t stat	4.90954294	
$p(T <= t)$ one-tail	2.3552E-05	
t-critical one-tail	1.70814076	
$p(T <= t)$ two-tail	4.7105E-05	
t-critical two-tail	2.05953855	

The researcher hypothesized that there is no correlation between qualitative and quantitative data for learning environment area of DI from the testing instruments. Comparing quantitative to qualitative learning environment resulted in a *t*-value of 4.9; $p<0.000$ and an *r*-value =.55 to the critical value of .532. The null hypothesis was rejected. There was a strong relationship that is significant between quantitative and qualitative learning environment data (see Table 52).

Table 52

Pearson Product-Moment Correlation Coefficient: Learning Environment – Quantitative and Qualitative

	Quantitative	Qualitative
Quantitative	1	
Qualitative	0.55216846	1

Curriculum Quantitative Versus Qualitative

Participants who received scores for qualitative data in the area of curriculum had a mean score of 3.29 in quantitative and 2.78 in qualitative, a median score of 3.36 in quantitative and 3 in qualitative, and a mode of 2.48 in quantitative and 3 in qualitative.

The minimum score received by a participant was 3 in quantitative and 1.5 in qualitative, and the maximum score for quantitative was 3.68 and qualitative was 3.5, providing a range of 1.19 in quantitative and 2 in qualitative. The maximum and minimum scores a participant could receive were 4.0 and 0.0, respectively (see Tables 53 and 54).

Table 53

Descriptive Statistics – Curriculum – Qualitative and Quantitative

Quantitative		Qualitative	
Mean	3.29762821	Mean	2.78846154
Median	3.36166667	Median	3
Mode	3.66666667	Mode	3
Range	1.19361111	Range	2
Minimum	2.48694444	Minimum	1.5
Maximum	3.68055556	Maximum	3.5

Table 54

t-Test: Paired Two Sample for Means – Curriculum – Qualitative and Quantitative

	Quantitative	Qualitative
Mean	3.29762821	2.78846154
Variance	0.09768843	0.24346154
Observations	26	26
Pearson correlation	0.49788912	
Hypothesized mean difference	0	
df	25	
t stat	5.99446657	
$p(T <= t)$ one-tail	1.4629E-06	
t-critical one-tail	1.70814076	
$p(T <= t)$ two-tail	2.9258E-06	
t-critical two-tail	2.05953855	

The researcher hypothesized that there is no correlation between qualitative and quantitative data for curriculum area of differentiated from the testing instruments. Comparing quantitative and qualitative curriculum data resulted in an $r=.49$ to the critical

value of .349. The null hypothesis was rejected. There was a positive relationship that is significant between quantitative and qualitative curriculum data (see Table 55).

Table 55

Pearson Product-Moment Correlation Coefficient: Curriculum – Quantitative and Qualitative

	Quantitative	Qualitative
Quantitative	1	
Qualitative	0.49788912	1

Assessment of Quantitative Versus Qualitative

Participants who received scores for qualitative data in the area of assessment had a mean score of 3.35 in quantitative and 2.98 in qualitative, a median score of 3.5 in quantitative and 3 in qualitative, and a mode of 3.55 in quantitative and 3 in qualitative. The minimum score received by a participant was 1.72 in quantitative and 1.5 in qualitative, and the maximum score for quantitative was 3.83 and qualitative was 4, providing a range of 2.1 in quantitative and 2.5 in qualitative. The maximum and minimum scores a participant could receive were 4.0 and 0.0, respectively (see Tables 56 and 57).

Table 56

Descriptive Statistics – Assessment – Qualitative and Quantitative

Quantitative		Qualitative	
Mean	3.35611111	Mean	2.98076923
Median	3.5	Median	3
Mode	3.55555556	Mode	3
Range	2.11111111	Range	2.5
Minimum	1.72222222	Minimum	1.5
Maximum	3.83333333	Maximum	4

Table 57

t-Test: Paired Two Sample for Means Assessment – Qualitative and Quantitative

	Quantitative	Qualitative
Mean	3.35611111	2.98076923
Variance	0.20192852	0.32961538
Observations	26	26
Pearson correlation	0.45242957	
Hypothesized mean difference	0	
df	25	
t stat	3.50536387	
$p(T <= t)$ one-tail	0.00087095	
t-critical one-tail	1.70814076	
$p(T <= t)$ two-tail	0.0017419	
t-critical two-tail	2.05953855	

The researcher hypothesized that there is no correlation between qualitative and quantitative data for assessment area of differentiated from the testing instruments. Comparing quantitative and qualitative assessment data resulted in an $r = .45$ to the critical value of .349. The null hypothesis was rejected. There was a positive relationship that is significant between quantitative and qualitative assessment data (see Table 58).

Table 58

Pearson Product-Moment Correlation Coefficient: Assessment – Quantitative and Qualitative

	Quantitative	Qualitative
Quantitative	1	
Qualitative	0.45242957	1

Instruction: Quantitative Versus Qualitative

Participants who received scores for qualitative data in the area of instruction had a mean score of 3.21 in quantitative and 3.17 in qualitative, a median score of 3.22 in quantitative and 3.17 in qualitative, and a mode of 3.21 in quantitative and 3 in qualitative. The minimum score received by a participant was 2.51 in quantitative and 2.5

in qualitative, and the maximum score for quantitative was 3.66 and qualitative was 4, providing a range of 1.15 in quantitative and 1.5 in qualitative. The maximum and minimum scores a participant could receive were 4.0 and 0.0, respectively (see Table 59 and 60).

Table 59

Descriptive Statistics – Instruction– Qualitative and Quantitative

Quantitative		Qualitative	
Mean	3.21887363	Mean	3.17307692
Median	3.22916667	Median	3
Mode	3.21428571	Mode	3
Range	1.1559127	Range	1.5
Minimum	2.51075397	Minimum	2.5
Maximum	3.66666667	Maximum	4

Table 60

t-Test: Paired Two Sample for Means Instruction – Qualitative and Quantitative

	Quantitative	Qualitative
Mean	3.21887363	3.17307692
Variance	0.0832168	0.15884615
Observations	26	26
Pearson correlation	0.45220944	
Hypothesized mean difference	0	
df	25	
t stat	0.62842868	
$p(T <= t)$ one-tail	0.26771142	
t-critical one-tail	1.70814076	
$p(T <= t)$ two-tail	0.53542285	
t-critical two-tail	2.05953855	

The researcher hypothesized that there is no correlation between qualitative and quantitative data for instruction area of differentiated from the testing instruments. Comparing quantitative and qualitative instruction data resulted in an $r = .45$ to the critical value of .349. The null hypothesis was rejected. There was a positive relationship that is significant between quantitative and qualitative instruction data (see Table 61).

Table 61

Pearson Product-Moment Correlation Coefficient: Instruction – Quantitative and Qualitative 3

	Quantitative	Qualitative
Quantitative	1	
Qualitative	0.45220944	1

Leadership: Quantitative Versus Qualitative

Participants who received scores for qualitative data in the area of leadership had a mean score of 3.30 in quantitative and 3.09 in qualitative, a median score of 3.36 in quantitative and 3 in qualitative, and a mode of 3.33 in quantitative and 3 in qualitative. The minimum score received by a participant was 2.32 in quantitative and 2 in qualitative, and the maximum score for quantitative was 3.83 and qualitative was 4, providing a range of 1.51 in quantitative and 2 in qualitative. The maximum and minimum scores a participant could receive were 4.0 and 0.0, respectively (see Tables 62 and 63).

Table 62

Descriptive Statistics: Leadership – Qualitative and Quantitative – 1

Quantitative		Qualitative	
Mean	3.30403846	Mean	3.09615385
Median	3.36111111	Median	3
Mode	3.33333333	Mode	3
Range	1.51305556	Range	2
Minimum	2.32027778	Minimum	2
Maximum	3.83333333	Maximum	4

Table 63

t-Test: Paired Two Sample for Means: Leadership – Qualitative and Quantitative – 2

	Quantitative	Qualitative
Mean	3.30403846	3.09615385
Variance	0.11644398	0.18038462
Observations	26	26
Pearson correlation	0.75597064	
Hypothesized mean difference	0	
df	25	
t stat	3.80268411	
$p(T <= t)$ one-tail	0.00041046	
t-critical one-tail	1.70814076	
$p(T <= t)$ two-tail	0.00082093	
t-critical two-tail	2.05953855	

The researcher hypothesized that there is no correlation between qualitative and quantitative data for leadership area of DI from the testing instruments. Comparing quantitative to qualitative leadership data resulted in an $r = .75$ to the critical value of .532. The null hypothesis was rejected. There was a strong relationship that is significant between quantitative and qualitative learning environment data (see Table 64).

Table 64

Pearson Product-Moment Correlation Coefficient: Leadership – Quantitative and Qualitative – 3

	Quantitative	Qualitative
Quantitative	1	
Qualitative	0.75597064	1

Summary

Both undergraduate and graduate preservice data was analyzed to determine if DI has a relationship with the overall teaching and learning practices of secondary preservice teacher candidates. The study also included an examination of preservice training among these teacher candidates. Finally, this study presented a comparison of Master of Arts in

Teaching programs to Bachelor of Arts in Teaching programs to determine which produced better-trained preservice teacher candidates in terms of DI knowledge and planning. No significant difference existed when analyzing the undergraduate and graduate preservice teaching candidate scores on all LEES, MEES, or MoPTA. When comparing instruments, there were mixed results for relationships between the testing instruments. Chapter Five provides a discussion of the data and recommendations for the Research University.

Chapter Five: Discussion and Reflection

Overview

Chapter Five includes the discussion, recommendations, implications, and future considerations resulting from this study of preservice candidates on the LEES, MEES, and MoPTA. The matched data set provided for the study had 32 participants, including 14 undergraduate and 18 graduate students from the same Research University. All participants completed the three testing instruments, with their scores provided for the study. This study sought to answer the question, what is the difference, if any, in teacher candidates' knowledge and application of DI in planning lessons, based upon enrollment in Masters of Arts teacher training programs versus enrollment in the Bachelor of Arts teacher training programs? The review of literature cited research on the differences between undergraduate and graduate preservice programs and the advantages and barriers with implementing DI in a classroom setting. The researcher provided the information to the Research University to increase the university's focus on preparing pre-service teaching candidates to implement DI strategies.

Chapter Five discusses findings of the statistical analysis in Chapter Four. To compare the planning and implementation of DI strategies of the undergraduate and graduate teacher education programs, the researcher investigated specific items from LEES surveys, MoPTA scores, and MEES evaluations. The researcher compared the quantitative data collected through Lindenwood University on these instruments. In addition, the researcher analyzed qualitative data from artifacts on MoPTA. By completing quantitative and qualitative analyses of these two identified groups, the study

provides feedback regarding undergraduate teacher education programs versus a graduate program in planning and implementing DI lessons during their clinical experience.

To compare the planning and implementation of DI strategies of the undergraduate and graduate teacher education programs, the researcher investigated specific items from LEES surveys, MoPTA scores, and MEES evaluations. The researcher compared the quantitative data collected through Lindenwood University on these instruments. In addition, the researcher analyzed qualitative data from open responses on MoPTA. By completing quantitative and qualitative analyses of these two identified groups, the study provides feedback regarding an undergraduate teacher education program versus a graduate program in planning and implementing DI lessons during their clinical experience.

Purpose of Study

The purpose of this study was to determine if DI has a relationship with the overall teaching and learning practices of secondary preservice teacher candidates. The study also included an examination of preservice training among these teacher candidates. Finally, this study presented a comparison of Master of Arts in Teaching programs to Bachelor of Arts in Teaching programs to determine which produced better-trained preservice teacher candidates in terms of DI knowledge and planning.

The researcher investigated three types of questions in this study to determine whether DI has a relationship with the overall teaching and learning practices of secondary preservice school teacher candidates. The questions explored whether the candidates were equally prepared on the same instruments, across instruments, and in knowledge as well as application.

Research Questions and Hypotheses Findings

The overarching research question that will guide this study is, what is the difference, if any, in teacher candidates' knowledge and application of differentiated instruction in planning lessons, based upon enrollment in Masters of Arts teacher training programs versus enrollment in the Bachelor of Arts teacher training programs? Three specific questions were addressed.

RQ1: To what extent do the undergraduate and graduate-level teacher educator programs at one Research University equally prepare teacher candidates to use differentiated instruction in their classrooms as a beginning teacher?

To investigate this question, three null hypotheses were tested, one related to each of the testing instruments.

***H*0*1*-LEES:** On the LEES, the scores of undergraduate preservice teachers will not differ from that of graduate preservice teachers.

The first hypothesis examined the difference between the scores on the LEES by college level, undergraduate ($\bar{X}$=3.53) versus graduate ($\bar{X}$=3.19). Because the results of a two-sample *t*-test ($t = 1.89$; $p = 0.07$) were greater than the required statistical significance of $p < .05$, the relationship was not statistically significant. The researcher did not reject the null hypothesis; these results suggested that at the Research University, no significant difference existed on the LEES between undergraduates and graduates.

RQ1: To what extent do the undergraduate and graduate-level teacher educator programs at one Research University equally prepare teacher candidates to use differentiated instruction in their classrooms as a beginning teacher?

$H_0$1-MEES: On the MEES, the scores of undergraduate preservice teachers will not differ from that of graduate preservice teachers.

The second hypothesis examined the difference between the scores on the MEES by college level, undergraduate ($\bar{X}$ = 3.61) versus graduate ($\bar{X}$ = 3.48). Because the results of a two-sample *t*-test (*t* = .56; *p* = 0.58) were greater than the required statistical significance of $p < .05$, the relationship was not statistically significant. The researcher did not reject the null hypothesis; these results suggested that at the Research University, no significant difference existed on the MEES between undergraduates and graduates.

$H_0$1-MoPTA: On the MoPTA, the scores of undergraduate preservice teachers will not differ from that of graduate preservice teachers.

The third hypothesis examined the difference between the scores on the MoPTA by college level, undergraduate ($\bar{X}$ = 2.66) versus graduate ($\bar{X}$ = 2.56). Because the results of a two-sample *t*-test (*t* = .63; *p* = 0.54) were greater than the required statistical significance of $p < .05$, the relationship was not statistically significant. The researcher did not reject the null hypothesis; these results suggested that at the Research University, a significant difference did not exist on the MoPTA between undergraduates and graduates with graduate level.

In addressing Research Question 1, the researcher began by comparing results for undergraduate and graduate teacher candidates on the same instrument. In this condition, the result of t-test statistical analysis indicated that the undergraduate and graduate-level teacher educator programs at the Research University equally prepared undergraduate and teacher candidates to use differentiated instruction in their classrooms as a beginning teacher.

RQ2: To what extent do the results of the LEES, MEES, and MoPTA differ when analyzed by education level (graduate/undergraduate)?

To investigate this question, two null hypotheses were tested: one for undergraduate teacher candidates and one for graduate teacher candidates. For each hypothesis, three *t*-test comparisons were conducted.

***H*$_0$2-U:** When comparing results across measures for undergraduate preservice teachers, the results comparisons for LEES to MEES, MEES to MoPTA, and LEES to MoPTA will not differ.

The fourth hypothesis examined the difference between the scores of undergraduates on each of the instruments in comparison to their results on the other instruments.

First, the relationship between scores on the LEES ($\bar{X}$= 3.53) and the MEES ($\bar{X}$ = 3.61) for undergraduate preservice teachers were compared. Because the results of a two-sample t-test (t = .63; p = 0.50) were greater than the required statistical significance of $p < .05$, the relationship was not statistically significant. The researcher did not reject the null hypothesis; these results suggested that at the Research University, a significant difference did not exist between the scores on the LEES and the MEES for undergraduate preservice candidates.

Next, the relationship between the scores on the MEES ($\bar{X}$ = 3.61) and the MoPTA undergraduate ($\bar{X}$ = 2.61) for undergraduate preservice teachers were compared. Because the results of a two-sample *t*-test (t = 6.81; p = 0.00) were less than the required statistical significance of $p < .05$, the relationship was statistically significant. The researcher rejected the null hypothesis; these results suggested that at the Research

University, a significant difference existed between undergraduate MEES and undergraduate MoPTA results with undergraduate level preservice teachers scoring significantly less on the MoPTA.

Finally, the relationship between the scores on the MoPTA ($\bar{X}$ = 2.66) and LEES ($\bar{X}$ = 2.53) for undergraduate preservice teachers were compared. Because the results of a two-sample *t*-test (*t* = -6.10; *p* = 0.00) were less than the required statistical significance of $p < .05$, the relationship was statistically significant. The researcher rejected the null hypothesis; these results suggested that at the Research University, a significant difference existed between undergraduate MoPTA and undergraduate LEES with undergraduate level preservice teachers scoring significantly less on the MoPTA.

$H_0 2_{\text{-U}}$: When comparing results across measures for graduate preservice teachers, the results comparisons for LEES to MEES, MEES to MoPTA, and LEES to MoPTA will not differ.

The fifth hypothesis examined the difference between the scores of graduate level students on each of the instruments in comparison to their results on the other instruments.

This examination began by comparing the difference between the scores on the LEES ($\bar{X}$=3.19) and MEES ($\bar{X}$=3.48). Because the results of a two-sample *t*-test (*t* = -1.13; *p* = 0.27) were greater than the required statistical significance of $p < .05$, the relationship was not statistically significant. The researcher did not reject the null hypothesis; these results suggested that at the Research University, a significant difference did not exist between the LEES results and MEES results for graduate preservice candidates.

Next, the relationship between the scores on the MEES ($\bar{X}$ = 3.48) and the MoPTA ($\bar{X}$ = 2.56) for graduate preservice teachers were compared. Because the results of a two-sample *t*-test (t = 3.92; p = 0.00) were less than the required statistical significance of $p < .05$, the relationship was statistically significant. The researcher rejected the null hypothesis; these results suggested that at the Research University, a significant difference existed between graduate MEES and graduate MoPTA results with graduate-level preservice teachers scoring significantly less on the MoPTA.

Finally, the relationship between the scores on the MoPTA ($\bar{X}$ = 2.56) and the LEES ($\bar{X}$ = 3.19). for graduate preservice teachers were compared. Because the results of a two-sample *t*-test (t = -3.34; p = 0.00) were less than the required statistical significance of $p < .05$, the relationship was statistically significant. The researcher rejected the null hypothesis; these results suggested that at the Research University, a significant difference existed between graduate MoPTA and graduate LEES with graduate-level preservice teachers scoring significantly less on the MoPTA.

The researcher found that when comparing results across measures by education level for undergraduate and graduate preservice teachers, the comparison results for LEES to MEES showed there was no significant difference in scores, whereas, there was a significant difference when comparing scores for the LEES with MoPTA and MoPTA with the MEES. Undergraduate and graduate-level preservice teacher candidates scored significantly higher on both the MEES and LEES in comparison with their scores on the MoPTA.

Post hoc analysis of the whole group, including both undergraduate and graduate-level preservice candidates, supported the results found from the analysis by education

level and instrument. They indicated that there was not a significant difference between the LEES and MEES, but there was between the MoPTA and any of the other instruments regardless of education level. This pattern of results indicates that MoPTA may be assessing different elements than the other two measures.

RQ3: When comparing qualitative and quantitative results by area of differentiated instruction (leadership, curriculum, instruction, learning environment, and assessment), to what extent will the results differ and/or be correlated within each area?

$H_0 3_{\text{-U}}$: When compared by DI area, the results for qualitative and quantitative measures will not differ nor have a moderate or stronger amount of correlation.

The sixth hypothesis analyzed the relationship between the qualitative data on each principle of DI and the quantitative data for the same principle. Five areas of DI were investigated: leadership, curriculum, instruction, learning environment, and assessment.

The researcher hypothesized that there is no correlation between qualitative and quantitative data for the learning environment principle of DI from the testing instruments. Comparing quantitative to qualitative learning environment ($t = 4.91$; $p = 0.00$) resulted in an $r = .55$. The null hypothesis was rejected. There was a significant difference between quantitative and qualitative learning environment data. At the Research University, the positive correlation indicated a strong relationship between the qualitative and quantitative data in the DI principle of learning environment. Those who did well on the quantitative tasks also did well on the qualitative tasks.

The researcher hypothesized that there is no correlation between qualitative and quantitative data for the curriculum principle of DI from the testing instruments.

Comparing quantitative to qualitative curriculum ($t = 6.0$; $p = 0.00$) resulted in an $r = .55$. The null hypothesis was rejected. There was a significant difference between quantitative and qualitative curriculum data. At the Research University, the positive correlation indicated a strong relationship between the qualitative and quantitative data in the DI principle of curriculum. Those that did well on the quantitative tasks, as well as on the qualitative tasks.

The researcher hypothesized that there is no correlation between qualitative and quantitative data for the assessment principle of DI from the testing instruments. Comparing quantitative to qualitative data for assessment ($t = 2.05$; $p = 0.00$) resulted in an $r = .45$. The null hypothesis was rejected. There was a significant difference between quantitative and qualitative assessment data. At the Research University, the positive correlation indicated a moderate relationship between the qualitative and quantitative data in the DI principle of assessment. Those who did well on the quantitative tasks tended to do well on the qualitative tasks.

The researcher hypothesized that there is no correlation between qualitative and quantitative data for the instruction principle of DI from the testing instruments. Comparing quantitative to qualitative data for instruction ($t = 2.06$; $p = 0.00$) resulted in an $r = .50$. The null hypothesis was rejected. There was a significant difference between quantitative and qualitative instruction data. At the Research University, the positive correlation indicated a strong relationship between the qualitative and quantitative data in the DI principle of instruction. Those who did well on the quantitative tasks also did well on the qualitative tasks.

The researcher hypothesized that there is no correlation between qualitative and quantitative data for the leadership principle of DI from the testing instruments. Comparing quantitative to qualitative data for leadership ($t = 2.06$; $p = 0.00$) resulted in an $r = .50$. The null hypothesis was rejected. There was a significant difference between quantitative and qualitative leadership data. However, the positive correlation indicated at the Research University, a strong relationship between the qualitative and quantitative data in the DI principle of leadership. Those who did well on the quantitative tasks also did well on the qualitative tasks.

Recommendation for the Program

The researcher provided multiple recommendations for the preservice teaching program at the Research University. The first recommendation of the researcher is for the Research University to provide opportunities for candidates to engage in activities that are more similar to the MoPTA. While the MoPTA has been discontinued, it provided opportunities for application of DI strategies to be assessed by supervisors.

The researcher recommends the Research University to use the LEES as a preassessment and use the information to guide instruction or learning experiences for preservice candidates. The researcher found no evidence that the university does a preassessment similar to the LEES. Data from the preassessment would provide the Research University an opportunity to use the data to guide their programs.

The last recommendation the researcher would recommend is providing a specific class on meeting the needs of diverse learners using a whole-child approach. The Research University does require a class in secondary students on content literacy for diverse learners but does not require such a course for middle school students.

Recommendation for Future Research

The researcher made recommendations for future research based on this study. The first recommendation is for the next researcher to utilize a larger sample population. The second recommendation is to utilize a larger population that includes a population across multiple universities in the same state. This would require other Universities to model an exit survey similar to the LEES. The last recommendation for future research would be to survey the participants of this study five years into their teaching career to gather data on their perceived preparedness based on their first five years of teaching.

Conclusion

The purpose of this study was to determine if DI has a relationship with the overall teaching and learning practices of secondary preservice teacher candidates. The study also included an examination of preservice training among these teacher candidates. Finally, this study presented a comparison of Master of Arts in Teaching programs to Bachelor of Arts in Teaching programs to determine which produced better-trained preservice teacher candidates in terms of DI knowledge and planning.

References

Abbas, A., & Abdurrahman, S. (2015). Students engagement variables as correlates of academic achievement in economics in senior secondary schools in Anambra State, Nigeria. *International Journal of Science and Research (IJSR), 6*(1), 1905-1922. doi:10.21275/v5i5.6051602

Abeysekera, L., & Dawson, P. (2014). Motivation and cognitive load in the flipped classroom: Definition, rationale and a call for research. *Higher Education Research & Development, 34*(1), 1-14. doi:10.1080/07294360.2014.934336

Acevedo, E. M. (2013). *Professional learning for teachers through a differentiated professional development program* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (UMI No. 1357147566). https://pqdtopen.proquest.com/doc/1357147566.html?FMT=AI

Adelman, S., & Taylor, L. (1999). Mental health in schools and system restructuring. *Clinical Psychology Review, 19*, 137-163. doi:10.1016/s0272-7358(98)00071-3

Astin, A. W. (1984). Student involvement: A developmental theory for higher education. *Journal of College Personnel, 25*, 297-308. Retrieved from https://muse.jhu.edu/journal/238

Bakker, B., Schaufeli, W. B., Leiter, M. P., & Taris, T. W. (2008). Work engagement: An emerging concept in occupational health psychology. *Work & Stress, 22*, 187-200. doi:10.1080/02678370802393649

Bal, P. (2016). The effect of the differentiated teaching approach in the algebraic learning field on students' academic achievements. *Eurasian Journal of Educational Research, 16*(63), 185-204. doi:10.14689/ejer.2016.63.11

Benson, P. (2013). *Teaching and researching autonomy*. London, England: Routledge.

Blackwell, W. H., Sheppard, M. E., Lehr, D., & Huang, S. (2017). Examining pre-service teacher candidates' sources and levels of knowledge about autism spectrum disorders. *Journal of Human Services: Training, Research, and Practice, 2*(2), 4. Retrieved from https://scholarworks.sfasu.edu/jhstrp/vol2/iss2/4

Borja, A., Soto, T., & Sanchez, X. (2015). Differentiating instruction for EFL learners. *International Journal of Humanities and Social Science, 5*(8), 30-36. Retrieved from https://www.ijhssnet.com/

Chapman, F. (2002). Alternative approaches to assessing student engagement rates. *Practical Assessment, Research, and Evaluation, 8*(13), 1-7. doi:10.7275/3e6e-8353

Cho, Y. H., Caleon, I. S., & Kapur, M. (2015). *Authentic problem solving and learning in the 21st century: Perspectives from Singapore and beyond*. Berlin, Germany: Springer.

Clark, M. A., Chiang, H. S., Silva, T., McConnell, S., Sonnenfeld, K., Erbe, A., & Puma, M. (2014). *The effectiveness of secondary math teachers from Teach for America and the teaching fellows programs* (NCEE 2013-4015). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute for Education Sciences, U.S. Department of Education.

Cole, R. W. (2008). *Educating everybody's children: Diverse teaching strategies for diverse learners*. Alexandria, VA: Association for Supervision and Curriculum Development

Conrad, P. (1992). Medicalization and social control. *Annual Review of Sociology, 18*(1), 209-232. doi:10.1146/annurev.so.18.080192.001233

Corthell, K. (2014). *The role of mental health counselors in public schools* (Unpublished doctoral dissertation). Atlanta, GA: Georgia State University.

Creswell, W., & Clark, V. P. (2018). *Designing and conducting mixed methods research*. Los Angeles, CA: Sage.

Cycyk, M., Bitetti, D., & Hammer, C. S. (2015). Maternal depressive symptomatology, social support, and language development of bilingual preschoolers from low-income households. *American Journal of Speech-Language Pathology, 24*, 411-425. doi:10.1044/2015_ajslp-14-0038

Dallas ISD Evaluation and Accountability. (2010). *Teach for America: Relative effectiveness and retention in the Dallas Independent School* (Issue brief). Dallas, TX: Dallas ISD.

Deci, L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *Educational Psychologist, 26*, 325-346. doi:10.1080/00461520.1991.9653137

Department of Elementary Secondary Education. (2019). Routes to certification. *Missouri Department of Elementary and Secondary Education*, 8 Nov. 2019. Retrieved from dese.mo.gov/educator-quality/certification/routes-certification.

Department of Elementary Secondary Education. (2016a). Teacher certification. *Missouri Pre-Service Teacher Assessment: Candidate and Educator Handbook*. Jefferson City, MO: MODESE.

Department of Elementary Secondary Education, (2016b). Teacher certification. *Teacher evaluation protocol*. Jefferson City, MO: MODESE.

Department of Elementary Secondary Education. (2017). Teacher certification. *Missouri teacher standards and quality indicators*. Jefferson City, MO: MODESE.

Department of Elementary Secondary Education. (2019). Teacher certification. *The teacher candidate in the clinical experience: MEES protocols and forms*. Retrieved from https://dese.mo.gov/sites/default/files/MEESTeacherCandidate SummativeScoringProtocol2019-2020Update.pdf

Deunk, I., Smale-Jacobse, A. E., Boer, H. D., Doolaard, S., & Bosker, R. J. (2018). Effective differentiation practices: A systematic review and meta-analysis of studies on the cognitive effects of differentiation practices in primary education. *Educational Research Review*, *24*, 31-54. doi:10.1016/j.edurev.2018.02.002

Deunk, M. I., Doolaard, S., Smalle-Jacobse, A., & Bosker, R. J. (2015). *Differentiation within and across classrooms: A systematic review of studies into the cognitive effects of differentiation practices*. RUG/GION. Retrieved from https://www.rug.nl/research/portal/en/publications/differentiation-within-and-across-classrooms (32b91640-ff59-4800-abf5-5aabd3ee7719).html

DeVito, M. (2016). *Factors influencing student engagement* (Unpublished doctoral dissertation). Fairfield, CT: Sacred Heart University.

Dewey, J. (1938). *Experience and Education*. New York, NY: Touchstone.

Dixon, A., Yssel, N., McConnell, J. M., & Hardin, T. (2014). Differentiated instruction, professional development, and teacher efficacy. *Journal for the Education of the Gifted, 37,* 111-127. doi:10.1177/0162353214529042

Dörnyei, Z. (2001). New themes and approaches in second language motivation research. *Annual Review of Applied Linguistics, 21,* 43-59. doi:10.1017/s0267190501000034

Duchesne, S., & Larose, S. (2018). Academic competence and achievement goals: Self-pressure and disruptive behaviors as mediators. *Learning and Individual Differences, 68,* 41-50. doi:10.1016/j.lindif.2018.09.008

Dunn, M. (1968). Special education for the mildly retarded: Is much of it justifiable? *Exceptional Children, 35*(1), 5-22. doi:10.1177/001440296803500101

Elrick, L. (2018, August 9). 4 types of learning styles: How to accommodate a diverse group of students. Rasmussen College. Retrieved from https://www.rasmussen.edu/degrees/education/blog/types-of-learning-styles/

Fish, E. (2019). Teacher race and racial disparities in special education. *Remedial and Special Education, 40,* 213-224. doi:10.1177/0741932518810434

Fletcher, A. (2005). *Meaningful student involvement: Guide to students as partners in school change* (2nd ed.). Olympia, WA: Freechild Project.

Gardner, H. (1983). *The theory of multiple intelligences*. Portsmouth, NH: Heinemann.

Gardner, H. (2011). *Frames of mind: The theory of multiple intelligences*. New York, NY: Basic Books.

Geel, M. V., Keuning, T., Frèrejean, J., Dolmans, D., Merriënboer, J. V., & Visscher, A. J. (2018). Capturing the complexity of differentiated instruction. *School Effectiveness and School Improvement, 30*(1), 51-67. doi:10.1080/09243453.2018.1539013

Gentry, R., Sallie, P., & Sanders, A. (2013, November). *Differentiated instructional strategies to accommodate students with varying needs and learning styles*. Paper prepared for the Urban Education Conference, Jackson, MS. Retrieved from https: //files.eric.ed.gov/fulltext/ED545458.pdf

Goddard, R., Goddard, Y., Kim, E. S., & Miller, R. (2015). A theoretical and empirical analysis of the roles of instructional leadership, teacher collaboration, and collective efficacy beliefs in support of student learning. *American Journal of Education, 121*, 501-530. doi:10.1086/681925

Gregory, A., Allen, J. P., Mikami, A. Y., Hafen, C. A., & Pianta, R. C. (2013). Effects of a professional development program on behavioral engagement of students in middle and high school. *Psychology in the Schools, 51,* 143-163. doi:10.1002/pits. 21741

Hackenberg, A. J., Creager, M., & Lee, M. Y. (2016). *Understanding how to differentiate instruction for middle school students*. San Francisco, CA: National Council for Teaching Mathematics.

Harry, B., & Klingner, J. K. (2005). *Why are so many minority students in special education? Understanding race and disability in schools*. New York, NY: Teachers College.

Hirsch, E., Ennis, R. P., & Driver, M. K. (2018). Three student engagement strategies to help elementary teachers work smarter, not harder, in mathematics. *Beyond Behavior*, *27*(1), 5-14. doi:10.1177/1074295617753113

Hogan, M. R. (2014). *Differentiated instruction in a standards-based middle school science classroom* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (UMI No. 1640887979).: https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=1032&context=dissertations

Holec, H. (1988). *Autonomy and self-directed learning: Present fields of application*. Strasbourg, England: Council for Cultural Co-operation.

Imbeau, B., & Tomlinson, C. A. (2010). *Leading and managing a differentiated classroom*. Alexandria, VA: Association for Supervision and Curriculum Development.

Jensen, E. (2019). *Poor students, Rich teaching: Seven high-impact mindsets for students from poverty*. Bloomington, IN: Solution Tree Press.

Johnson, B. (2012, March 1). How do we know when students are engaged? [Web log]. *Edutopia.* Retrieved from https://www.edutopia.org/blog/student-engagement-definition-ben-johnson

Joseph, S., Thomas, M., Simonette, G., & Ramsook, L. (2013). The impact of differentiated instruction in a teacher education setting: Successes and challenges. *International Journal of Higher Education, 2*(3), 28-40. doi:10.5430/ijhe.v2n3p28

Kolb, A., Boyatzis, R. E., & Mainemelis, C. (2014). Experiential learning theory: Previous research and new directions. *Perspectives on Thinking, Learning, and Cognitive Styles, 1*(8), 227-248. doi:10.4324/9781410605986-9

Kuh, G. D. (1999). How are we doing? Tracking the quality of the undergraduate experience, 1960s to the present. *Review of Higher Education, 1*(22), 99-120. Retrieved from https://muse.jhu.edu/article/30069

Lavin, M. F. (2016). They call us problem child: Delinquency, medicalization, and social class in primary education. *Deviant Behavior, 37,* 1276-1287. doi:10.1080/01639625.2016.1174517

Little, A., McCoach, D. B., & Reis, S. M. (2014). Effects of differentiated reading instruction on student achievement in middle school. *Journal of Advanced Academics, 25,* 384-402. doi:10.1177/1932202x14549250

Littlewood, W. (1996). "Autonomy": An anatomy and a framework. *System, 24,* 427-435. doi:10.1016/s0346-251x(96)00039-5

Lockley, J., Jackson, N., Downing, A., & Roberts, J. (2017). University instructors' responses on implementation of differentiated instruction in teacher education programs. (ERIC Document Reproduction Service No. ED572728). Retrieved from http://files.eric.ed.gov/fulltext/ED572728.pdf

Matthews, E., Cook-Sather, A., Acai, A., Dvorakova, S. L., Felten, P., Marquis, E., & Mercer-Mapstone, L. (2018). Toward theories of partnership praxis: An analysis of interpretive framing in literature on students as partners in teaching and learning. *Higher Education Research & Development, 38*, 280-293. doi:10.1080/07294360.2018.1530199

McCarthy, J. (2014, July 23). 3 ways to plan for diverse learners: What teachers do. *Edutopia*. Retrieved from https://www.edutopia.org/blog/differentiated-instruction-ways-to-plan-john-mccarthy

Meyers-Wagner, K. (2015). *Transforming teacher preparation: A collective case study of cooperating teachers and teacher candidates in the co-teaching model of student teaching* (Doctoral dissertation). Available from ProQuest Dissertations and

Theses Global. (UMI NO. 1680772950). https://pqdtopen.proquest.com/doc/1680772950.html?FMT=ABS.

Morgan, H. (2013). Maximizing student success with differentiated learning. *Clearing House: A Journal of Educational Strategies, Issues and Ideas, 87*(1), 34-38. doi:10.1080/00098655.2013.832130

Morse, L., & Allensworth, D. D. (2015). Placing students at the center: The whole school, whole community, whole child model. *Journal of School Health, 85*, 785-794. doi:10.1111/josh.12313

Mulder, Q. (2014). *The effect of differentiated instruction on student mathematics achievement in primary school classrooms* (Unpublished Master's thesis). Netherlands: University of Twente, Enschede.

Muthomi, W., & Mbugua, K. (2014). Effectiveness of differentiated instruction on secondary school students' achievement in mathematics. *International Journal of Applied Science and Technology, 4*(1), 116-122. Retrieved from http://www.ijastnet.com/journals/Vol_4_No_1_January_2014/12.pdf

Nag, A. (2017). *Teachers as learners: Impacts of graduate teachers' education programs' features on in-service teachers' practices* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global. (UMI No. 2013317300). https://library.ndsu.edu/ir/bitstream/handle/10365/28544/Teachers%20as%20Learners%20Impacts%20of%20Graduate%20Teachers%20Education%20Programs%E2%80%99%20Features%20on%20In-Service%20Teachers%E2%80%99%20Practices.pdf?sequence=1&isAllowed=y

Newton, M. (2015). The learning styles myth is thriving in higher education. *Frontiers in Psychology, 6*. doi:10.3389/fpsyg.2015.01908

Núñez, L., & León, J. (2015). Autonomy support in the classroom. *European Psychologist, 20*, 275-283. doi:10.1027/1016-9040/a000234

Osuafor, A. M., & Okigbo, E. C. (2013). Effect of differentiated instruction on the academic achievement of Nigerian secondary school biology students. *Educational Research*, *4*, 555-560. Retrieved from https://www.semantic scholar.org/paper/Effect-of-differentiated-instruction-on-the-of-Osuafor-Okigbo/a71d28fa56d3dc09b25ab42811ff81f5bf169faa

Pannell, C. (2016). *What really works in teacher preparation programs: Teachers' self-efficacy and perceived successful methods after participation in Mississippi's career and technical education alternate route program* (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses Global. (UMI No. 1822268939). https://pqdtopen.proquest.com/doc/1822268939.html?FMT=ABS

Pintrich, R., & Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, *82*(1), 33-40. doi:10.1037/0022-0663.82.1.33

Ricco, R., Pierce, S. S., & Medinilla, C. (2009). Epistemic beliefs and achievement motivation in early adolescence. *Journal of Early Adolescence, 30*, 305-340. doi:10.1177/0272431609333299

Rickenbrode, R. (2018, June 26). Re: Who does it better? Comparing undergraduate and graduate teacher training programs [Web log]. *National Council on Teacher Quality.* Retrieved from https://www.nctq.org/blog/Who-does-it-better-Comparing-undergraduate-and-graduate-teacher-training-programs

Rimm-Kaufman, E., Larsen, R. A., Baroody, A. E., Curby, T. W., Ko, M., Thomas, J. B., . . . Decoster, J. (2014). Efficacy of the responsive classroom approach. *American Educational Research Journal, 51*, 567-603. doi:10.3102/0002831214523821

Robinson, L., Maldonado, N., & Whaley, J. (2014). *Perceptions about implementation of differentiated instruction* (pp. 1-22). Mid-South Educational Research Annual Conference, Knoxville, TM. (ERIC Document Reproduction Service No. ED554312).

Rodas, H. (2016). *A comparative analysis of middle level teacher preparation and certification in California* (Unpublished doctoral dissertation). Malibu, CA: Pepperdine University.

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and Extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54-67. doi:10.1006/ceps.1999.1020

Schleicher, A. (2016). *Teaching excellence through professional learning and policy reform: Lessons from around the world*. International Summit on the Teaching Profession. doi:10.1787/9789264252059-en

Schneider, C. G., & Humphreys, D. (2005). Putting Liberal Education on the Radar Screen. *The Chronicle of Higher Education.* Retrieved from www.chronicle.com/article/Putting-Liberal-Education-on/26781.

Shernoff, J., Kelly, S., Tonks, S. M., Anderson, B., Cavanagh, R. F., Sinha, S., & Abdi, B. (2016). Student engagement as a function of environmental complexity in high school classrooms. *Learning and Instruction, 43*, 52-60. doi:10.1016/j.learninstruc.2015.12.003

Sinatra, M., Heddy, B. C., & Lombardi, D. (2015). The challenges of defining and measuring student engagement in science. *Educational Psychologist, 50,* 1-13. doi:10.1080/00461520.2014.1002924

Singmaster, H. (2018, November 12). The importance of diverse perspectives and how to foster them [Web log]. *Global Learning.* Retrieved from https://blogs.edweek.org/edweek/global_learning/2018/11/the_importance_of_diverse_perspectives_and_how_to_foster_them_1.html

Skinner, A., & Belmont, M. J. (1993). Motivation in the classroom: Reciprocal effects of teacher behavior and student engagement across the school year. *Journal of Educational Psychology, 85*, 571-581. doi:10.1037/0022-0663.85.4.571

Smets, W., & Struyven, K. (2018). Realist review of literature on catering for different Instructional needs with preteaching and extended instruction. *Education Sciences, 8*(3), 113. doi:10.3390/educsci8030113

Soyer, M. K., & Kirikkanat, B. (2019). Undergraduates' achievement goal orientations, academic self-efficacy and hope as the predictors of their learning approaches. *European Journal of Educational Research, 8*(1), 99-106. Retrieved from https://www.eu-jer.com/

Subban, K., & Round, P. (2015). Differentiated instruction at work. reinforcing the art of classroom observation through the creation of a checklist for beginning and pre-service teachers. *Australian Journal of Teacher Education, 40*(5), 113-131. doi: 10.14221/ajte.2015v40n5.7

Tedesco, G. (2013). *The challenge of inclusive education in relation to differentiated instruction* (Unpublished Master's thesis). Ontario, Canada: University of Toronto.

Teng, (M. F. (2019) *Autonomy, agency, and identity in teaching and learning English as a foreign language*. Singapore: Springer.

Thakur, K. (2014). Differentiated instruction the in the inclusive classroom. *Research Journal of Educational Sciences, 2*(7), 10-14. Retrieved from http://www.isca.in/EDU_SCI/Archive/v2/i7/2.%20ISCA-RJEduS-2014-025.pdf

Thompson, R., & Serra, M. (2005). Use of course evaluation to assess the contributions of curricular and pedagogical initiatives to undergraduate general education learning objectives. *Education, 125*, 693-701. Retrieved from EBSCO database. https://web.b.ebscohost.com/abstract?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=00131172&AN=17488995&h=k%2bQFANWoP8mmKyemdo9PYP6fd%2fbMCrS3qlANMh4y0VDXZoMX%2f2YdRdTr1TwSeiCUxcvE8vALhzl6kM2ZIWf%2bXg%3d%3d&crl=f&resultNs=AdminWebAuth&resultLocal=ErrCrlNotAuth&crlhashurl=login.aspx%3fdirect%3dtrue%26profile%3dehost%26scope%3dsite%26authtype%3dcrawler%26jrnl%3d00131172%26AN%3d17488995

Tomlinson, C. A. (2001). *How to differentiate instruction in mixed-ability classrooms*. New York, NY: Pearson Education.

Tomlinson, A. (2015). *The differentiated classroom: Responding to the needs of all learners*. Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, A., & Allan, S. D. (2006). *Leadership for differentiating schools & classrooms*. Victoria, Canada: Hawker Brownlow Education.

Tomlinson, A., Brighton, C., Hertberg, H., Callahan, C. M., Moon, T. R., Brimijoin, K., . . . Reynolds, T. (2003). Differentiating instruction in response to student readiness, interest, and learning profile in academically diverse classrooms: A review of literature. *Journal for the Education of the Gifted, 27,* 119-145. doi:10.1177/016235320302700203

Tomlinson, C. A., & T. R. Moon. (2013). *Assessment and student success in a differentiated classroom*. Australia: Cheltenham VIC 3192, Hawker Brownlow Education.

U.S. Department of Education. (2019). *Digest of education statistics, 2016*. Retrieved from https://nces.ed.gov/programs/digest/d16/tables/dt16_204.27.asp

U.S. Department of Education, Office of Special Education Programs. (2007, July 19). *History: Twenty-five years of progress in educating children with disabilities through IDEA*. Retrieved from https://www2.ed.gov/policy/speced/leg/idea/history.html

Valiandes, S. (2015). Evaluating the impact of differentiated instruction on literacy and reading in mixed ability classrooms: Quality and equity dimensions of education effectiveness. *Studies in Educational Evaluation, 45,* 17-26. doi:10.1016/j.stueduc.2015.02.005

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wadsworth, D. D., Daly, C. M., & Foote, S. J. (2018). Active gaming and self-paced exercise: A self-determination perspective. *Journal of Sports Medicine and Therapy, 3*(2), 043-052. doi:10.29328/journal.jsmt.1001026

Wigfield, A., & Eccles, J. S. (2002). The development of competence beliefs, expectancies for success, and achievement values from childhood through adolescence. *Development of Achievement Motivation*, 91-120. doi:10.1016/b978-012750053-9/50006-1

Willingham, T., Hughes, E. M., & Dobolyi, D. G. (2015). The scientific status of learning styles theories. *Teaching of Psychology, 42*, 266-271. doi:10.1177/0098628315589505

Shi, Y., Levesque-Bristol, C., & Maeda, Y. (2017). General need for autonomy and subjective well-being: A meta-analysis of studies in the U.S. and East Asia. *Journal of Happiness Studies*, *19*(6), 1863–1882., doi:10.1007/s10902-017-9898-2.

Zimmerman, J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice, 41*, 64-70. doi:10.1207/s15430421tip4102_2

Zimmerman, B. J., & Schunk, D. H. (Eds.). (1989). *Self-regulated learning and academic achievement*. New York, NY: Taylor & Francis.

Zimmermann, P., & Iwanski, A. (2014). Emotion regulation from early adolescence to emerging adulthood and middle adulthood. *International Journal of Behavioral Development, 38*, 182-194. doi:10.1177/0165025413515405

Appendix A

MoPTA/MEES/ LEES Raw Scores

MoPTA Raw Scores

Participant Code	Level	Pts Possible	MoPTA NV Result	Task 2 Average Pts	Task 3 Average Pts	Task 4 Average Pts	MO PAT Score	MoPTA Total Avg Score
1	BA/BS	4	Passed	1.7233	1.21	1.75	17.01	1.5
2	MAT	4	Passed	2.8333	2.25	2	25.5	2.5
3	MAT	4	Passed	2.5	1.5	2.25	22.5	3
4	MAT	4	Passed	2.6667	1.625	2.625	25	3
5	MAT	4	Passed	2.1667	2	2.5	24.5	2.5
6	BA/BS	4	Passed	3.3333	1.875	1.875	25	3
7	BA/BS	4	Passed	3.3333	2.125	2.125	27	3
8	BA/BS	4	Passed	3.5	2.5	2.25	29.5	3.5
9	BA/BS	4	Passed	3	2.25	1.5	24	3.5
10	BA/BS	4	Passed	2.8333	1.5	2.375	24	3
11	MAT	4	Passed	3	2.25	2.25	27	3
12	MAT	4	Passed	3	2.25	2.5	28	3
13	BA/BS	4	Passed	3	2.1675	2.5	27.67	3
14	MAT	4	Passed	3.3333	1.875	2.125	26	3
15	BA/BS	4	Passed	2.5	1.875	2.125	23.5	2.5
16	MAT	4	Passed	3.1667	2.625	2.125	28.5	3
17	BA/BS	4	Passed	3	2.125	2.125	26	3
18	BA/BS	4	Passed	3.3333	2.375	2.375	29	3
19	MAT	4	Passed	2.8333	2.625	2	27	2.5
20	MAT	4	Passed	2.6667	2.25	2.25	26	3
21	MAT	4	Passed	3	2.25	2.375	27.5	3
22	BA/BS	4	Passed	2.8333	1.0825	1.5	18.83	2.5
23	BA/BS	4	Passed	3	1.875	2.25	25.5	3
24	BA/BS	4	Passed	2.89	2.625	2.125	27.67	3
25	BA/BS	4	Passed	3.1667	2.25	2.25	27.5	3
26	MAT	4	Passed	3	2.375	2.125	27	3
27	BA/BS	4	Passed	3.5	2.375	2.125	28.5	3.5

MoPTA Raw Scores Continued

Participant Code	Level	Pts Possible	MoPTA NV Result	Task 2 Average Pts	Task 3 Average Pts	Task 4 Average Pts	MO PAT Score	MoPTA Total Avg Score
28	MAT	4	NOT PASSED	2.8333	0	1.5	14.5	3
29	BA/BS	4	Passed	2.8333	2.125	2.625	27.5	3
30	BA/BS	4	Passed	3.3333	2.625	1.75	27.5	3.5
31	BA/BS	4	Passed	3.1667	2.25	2	26.5	3.5
32	BA/BS	4	Passed	2.8333	2.625	2.25	28	3
33	MAT	4	Passed	3.3333	2.375	2.375	29	3
34	MAT	4	Passed	2.8333	2	2.25	25.5	3
35	BA/BS	4	Passed	3.1667	2.125	2.375	27.5	3.5
35	BA/BS	4	Passed	3.1667	2.125	2.375	27.5	3.5
36	MAT	4	Passed	1.2233	2	2.25	20.67	0
37	MAT	4	Passed	3.5	2.25	2.125	28	3.5
38	BA/BS	4	Passed	3.5	2.125	2.375	28.5	3.5
39	MAT	4	Passed	2.1667	1.625	1.125	17.5	2.5
40	MAT	4	Passed	3.3333	2.375	2.625	30	3.5
41	BA/BS	4	Passed	2.3333	2.25	2.125	24.5	3
42	BA/BS	4	Passed	2.3333	2	1.625	21.5	2

LEES Raw Scores

Participant Code	Level of Education	the knowledge required to teach my content area(s).	engage students in my content area(s).	make my content area(s) meaningful to students.	incorporate interdisciplinary instruction	design lessons that address differentiated instruction	modify instruction for English language learners	implement instruction based on a student's IEP	create lesson plans to engage all learners	develop lessons based on state standards	develop lessons based on district curriculum	deliver lessons aligned with curriculum standards	deliver lessons for diverse learners	employ a variety of instructional strategies	engage students in critical thinking and problem solving	incorporate cooperating learning activities	use technology to enhance instruction	create a classroom environment that encourages student engagement	use a variety of classroom management practices	handle a variety of discipline issues	motivate my students to learn	keep my students on task	foster positive student relationships	manage time in the classroom	manage space in the classroom	facilitate transitions in the classroom	use communication skills to foster learning	effectively communicate with parents	effectively communicate with all staff	promote respect for diversity	use technology as a communication tool	enhance student communication skills through technology	use assessments to evaluate student learning	develop assessments to evaluate student learning	analyze assessment data to improve instruction	help students set learning goals using assessment results	work with colleagues to set learning goals using assessment results	analyze data to evaluate the outcomes of collaborative efforts	analyze data to reflect on areas for professional growth	reflect on constructive criticism from my mentor	partner with colleagues to support student learning	partner with parents to support student learning	interact with professional organizations
1	BA/BS	V WP	WP	WP	V WP	V WP	WP	WP	WP	V WP	WP	WP	WP	V WP	V WP	V WP	WP	V WP	WP	V WP	V WP	V WP	WP	WP	WP	WP	WP	V WP	V WP	V WP	V WP	WP	V WP	WP	V WP	WP	WP	V WP	WP	WP	WP
2	MAT	WP	WP	AP	AP	AP	IP	WP	WP	WP	WP	WP	WP	WP	WP	WP	AP	WP	WP	AP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	AP	WP	AP	AP	WP	AP	AP	AP	WP	WP	WP
3	MAT	WP	WP	AP	WP	V WP	AP	AP	V WP	V WP	WP	WP	V WP	V WP	V WP	V WP	WP	WP		V WP	WP	V WP	V WP	V WP	WP	AP	AP	V WP	WP	AP	WP	WP	WP	V WP	V WP	V WP	WP	WP	WP	WP	WP	AP	WP
4	MAT	IP	AP	AP	AP	AP	AP	WP	WP	WP	WP	WP	WP	WP	WP	AP	WP	WP	WP	AP	AP	WP	AP	WP	AP	AP	AP	WP	WP	WP	WP	WP	WP	WP	AP	WP	AP	AP	WP	WP	WP	V WP
5	MAT	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP
7	BA/BS	V WP	V WP	WP	WP	WP	AP	WP	WP	V WP	WP	WP	WP	AP	WP	WP	WP	V WP	WP	AP	WP	WP	V WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	V WP	V WP	WP	WP	WP	WP	V WP	V WP	WP	WP
8	BA/BS	AP	V WP	WP	WP	V WP	AP	IP	WP	WP	WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	WP	WP	V WP	V WP	AP	WP	WP	WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	AP	AP	IP
9	BA/BS	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP
11	MAT	V WP	V WP	V WP	V WP	V WP	V WP	WP	V WP	V WP	WP	WP	V WP	V WP	WP	V WP	V WP	V WP	V WP	WP	V WP	V WP	V WP	WP	WP	V WP		WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP
12	MAT	V WP	WP	WP	WP	AP	AP	WP	WP	V WP	V WP	V WP	WP	AP	WP	V WP	WP	WP	V WP	V WP	WP	WP	V WP	V WP	V WP	V WP	WP	WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	WP
13	BA/BS	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP
14	MAT	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP		V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP			V WP	WP	WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	WP	WP	WP
16	MAT	AP	AP	AP	AP	AP	AP	IP	WP	WP	WP	WP	WP	AP	AP	AP	WP	WP	WP	WP	WP	WP	AP	WP	WP	WP	WP	AP	AP	AP	WP	WP	WP	WP	WP	WP	AP	AP	AP	AP	AP	AP
18	BA/BS	V WP	V WP	V WP		V WP	WP	V WP	V WP	WP	V WP	V WP	V WP	V WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	WP	V WP	WP	V WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	WP	WP	V WP	V WP	V WP	V WP	WP
19	MAT	AP	WP	WP	AP	AP	AP	AP	WP	WP	AP	WP	AP	WP	WP	WP	WP	WP	WP	WP	AP	AP	AP	WP	AP	AP	AP	AP	AP	WP	WP	WP	WP	WP	WP	WP	WP	AP	AP	AP	WP	WP	AP	AP	WP
20	MAT	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP
21	MAT	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP
22	BA/BS	V WP	V WP	V WP	WP	V WP	AP	V WP	V WP	AP	AP	WP	WP	V WP	V WP	V WP	V WP	V WP	WP	V WP	AP	WP	V WP	V WP	V WP	V WP	V WP	IP	IP		V WP	V WP	V WP	V WP	V WP	WP	V WP	V WP	V WP	V WP	V WP	AP	V WP
27	BA/BS	V WP	V WP	WP	WP	V WP	IP	AP	V WP	V WP	V WP	V WP	WP	WP	AP	WP	WP	WP	WP	IP	AP		V WP	V WP	V WP	V WP	V WP	V WP	AP	IP	AP	V WP	V WP	V WP	V WP	AP	AP	AP	AP	IP	IP
28	MAT	AP	WP	WP	AP	IP	IP	IP	AP	AP	AP	AP	IP	IP	AP	IP	AP	AP	AP	AP	WP	AP	WP	IP	AP	AP	WP	AP	AP	WP	AP	AP	IP	IP	IP	AP	AP	AP	AP	AP	AP	AP
29	BA/BS	V WP	WP	V WP	AP	WP	AP	IP	V WP	WP	AP	V WP	WP	V WP	V WP	WP	V WP	V WP	V WP	V WP	V WP	AP	V WP	WP	V WP	WP	V WP	V WP	WP	V WP	V WP	V WP	V WP	V WP	WP	V WP	WP	V WP	WP	V WP	WP	V WP	IP

LEES Raw Scores (Continued)

Participant Code	Level of Education	the knowledge required to teach my content area(s).	engage students in my content area(s).	make my content area(s) meaningful to students.	incorporate interdisciplinary instruction	design lessons that address differentiated instruction	modify instruction for English language learners	implement instruction based on a student's IEP	create lesson plans to engage all learners	develop lessons based on state standards	develop lessons based on district curriculum	deliver lessons aligned with curriculum standards	deliver lessons for diverse learners	employ a variety of instructional strategies	engage students in critical thinking and problem solving	incorporate cooperating learning activities	use technology to enhance instruction	create a classroom environment that encourages student engagement	use a variety of classroom management practices	handle a variety of discipline issues	motivate my students to learn	keep my students on task	foster positive student relationships	manage time in the classroom	manage space in the classroom	facilitate transitions in the classroom	use communication skills to foster learning	effectively communicate with parents	effectively communicate with all staff	promote respect for diversity	use technology as a communication tool	enhance student communication skills through technology	use assessments to evaluate student learning	develop assessments to evaluate student learning	analyze assessment data to improve instruction	help students set learning goals using assessment results	work with colleagues to set learning goals using assessment results	analyze data to evaluate the outcomes of collaborative efforts	analyze data to reflect on areas for professional growth	reflect on constructive criticism from my mentor	partner with colleagues to support student learning	partner with parents to support student learning	interact with professional organizations
30	BA/BS	WP	AP	V WP	WP	AP	IP	WP	WP	WP	WP	WP	WP	WP	WP	WP	V WP	V WP	V WP	IP	WP	WP	V WP	WP	WP	IP	V WP	AP	WP	V WP	V WP	V WP	WP	V WP	AP	WP	V WP	WP	IP	WP
31	BA/BS	V WP	V WP	V WP	WP	V WP	WP	V WP	V WP	V WP	V WP	V WP	WP	V WP	V WP	V WP	WP	V WP	V WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	WP	V WP	V WP	V WP	V WP	V WP
33	MAT	V WP	V WP	WP	WP	AP	AP	WP	WP	AP	WP	WP	WP	WP	V WP	V WP	V WP	WP	V WP	V WP	WP	WP	V WP	WP	WP	WP	WP	WP	WP	V WP	WP	WP	WP	WP	WP	AP	AP	WP	WP	WP	WP
34	MAT	V WP	V WP	V WP	V WP	WP	WP	WP	WP	V WP	V WP	V WP	V WP	V WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	WP	WP	WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP
35	BA/BS	WP	V WP	V WP	V WP	V WP	IP	WP	V WP	V WP	AP	AP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	AP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	WP
36	MAT	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP
37	MAT	V WP	V WP	V WP	WP	WP	WP	V WP	V WP	V WP	V WP	V WP	WP	WP	WP	WP	V WP	V WP	V WP	WP	WP	V WP	V WP	V WP	V WP	WP	WP	WP	V WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	WP	V WP	V WP	V WP	V WP
38	BA/BS	V WP	V WP	V WP	V WP	V WP	IP	WP	V WP	V WP	WP	V WP	V WP	V WP	WP	V WP	WP	V WP	WP	WP	V WP	WP	V WP	V WP	V WP	V WP	V WP	IP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	AP	WP	WP
39	MAT	AP	WP	WP	WP	WP	IP	IP	V WP	IP	IP	IP	WP	WP	AP	AP	WP	AP	AP	IP	AP	AP	WP	WP	WP	AP	AP	IP	AP	WP	AP	AP	AP	AP	IP		AP	IP	IP	WP	WP	WP	AP
40	MAT	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP
41	BA/BS	V WP	V WP	WP	V WP	WP	AP	WP	V WP	V WP	V WP	V WP	WP	V WP	WP	V WP	V WP	WP	WP	AP	AP	WP	WP	V WP	V WP	V WP	V WP	AP	V WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	AP	WP
43	MAT	V WP	V WP	V WP	AP	IP	IP	WP	WP	V WP	V WP	V WP	WP	AP	AP	AP	V WP	V WP	WP	WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	AP	AP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	AP	V WP	AP
44	#N/A	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP
45	#N/A	V WP	V WP	V WP	V WP	V WP	AP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	V WP	WP	V WP	V WP	WP	V WP

MEES Raw Scores

Participant Code	Degree you are seeking	1.1 Content Knowledge and Academic Language (MoPTA Task 4) (Points)	1.2 Student Engagement in Subject Matter (MoPTA Tasks 3, 4) (Points)	2.4 Differentiated Lesson Design (MoPTA Tasks 1, 2, 3, 4) (Points)	3.1 Implementation of Curriculum Standards (MoPTA Tasks 1, 2, 3) (Points)	3.2 Lessons for Diverse Learners (MoPTA Tasks 3, 4) (Points)	4.1 Instructional Strategies Leading to Student Engagement in Problem- Solving and Critical	5.1 Classroom Management Techniques (MoPTA Tasks 1, 4) (Points)	5.2 Management of Time, Space, Transitions, and Activities (MoPTA Task 4) (Points)	5.3 Classroom, School, and Community Culture (MoPTA Task 1) (Points)	6. Utilizing Effective Communication (Points)	6.1 Verbal and Non-Verbal Communication (MoPTA Task 4) (Points)	7.1 Effective Use of Assessments (MoPTA Task 2, 4) (Points)	7.2 Assessment Data to Improve Learning (MoPTA Tasks 1, 2) (Points)	7.5 Communication of Student Progress and Maintaining Records (MoPTA Task 2) (Points)	8.1 Self-Assessment and Improvement (MoPTA Tasks 2, 3, 4) (Points)	9.1 Induction and Collegial Activities (MoPTA Task 4) (Points)	9.3 Cooperative Partnerships in Support of Student Learning (MoPTA Tasks 1, 2, 4)
1	BA/BS	2	2	1	2	2	2	1	1	2	2	2	1	1	1	2	2	2
2	MAT	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
3	MAT	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	3
4	MAT	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
5	MAT	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
6	BA/BS	3	3	3	3	3	2	1	2	2	2	2	3	3	3	1	3	3
7	BA/BS	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
8	BA/BS	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3
9	BA/BS	3	2	2	2	2	2	3	2	3	3	3	2	2	2	2	2	2
10	BA/BS	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
11	MAT	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

MEES Raw Scores (Continued)

Participant Code	Degree you are seeking	1.1 Content Knowledge and Academic Language (MoPTA Task 4) (Points)	1.2 Student Engagement in Subject Matter (MoPTA Tasks 3, 4) (Points)	2.4 Differentiated Lesson Design (MoPTA Tasks 1, 2, 3, 4) (Points)	3.1 Implementation of Curriculum Standards (MoPTA Tasks 1, 2, 3) (Points)	3.2 Lessons for Diverse Learners (MoPTA Tasks 3, 4) (Points)	4.1 Instructional Strategies Leading to Student Engagement in Problem- Solving and Critical	5.1 Classroom Management Techniques (MoPTA Tasks 1, 4) (Points)	5.2 Management of Time, Space, Transitions, and Activities (MoPTA Task 4) (Points)	5.3 Classroom, School, and Community Culture (MoPTA Task 1) (Points)	6. Utilizing Effective Communication (Points)	6.1 Verbal and Non-Verbal Communication (MoPTA Task 4) (Points)	7.1 Effective Use of Assessments (MoPTA Task 2, 4) (Points)	7.2 Assessment Data to Improve Learning (MoPTA Tasks 1, 2) (Points)	7.5 Communication of Student Progress and Maintaining Records (MoPTA Task 2) (Points)	8.1 Self-Assessment and Improvement (MoPTA Tasks 2, 3, 4) (Points)	9.1 Induction and Collegial Activities (MoPTA Task 4) (Points)	9.3 Cooperative Partnerships in Support of Student Learning (MoPTA Tasks 1, 2, 4)
12	MAT	3	3	2	3	2	3	2	2	2	3	3	2	2	2	3	3	3
13	BA/BS	3	2	2	3	2	2	2	2	2	2	2	2	2	2	1	3	3
14	MAT	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
14	MAT	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
15	BA/BS	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2
16	MAT	3	3	3	3	3	2	3	3	3	3	3	3	2	2	3	3	3
17	BA/BS	3	3	3	3	3	3	2	3	3	3	3	2	3	3	3	3	3
18	BA/BS	3	3	3	3	3	3	2	2	3	3	3	3	3	2	3	3	3
19	MAT	2	2	1	2	1	2	2	2	2	2	2	2	2	1	2	1	2
20	MAT	3	3	3	3	2	2	3	2	3	3	3	3	3	3	3	3	3
21	MAT	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3	3	2

MEES Raw Scores (Continued)

Participant Code	Degree you are seeking	1.1 Content Knowledge and Academic Language (MoPTA Task 4) (Points)	1.2 Student Engagement in Subject Matter (MoPTA Tasks 3, 4) (Points)	2.4 Differentiated Lesson Design (MoPTA Tasks 1, 2, 3, 4) (Points)	3.1 Implementation of Curriculum Standards (MoPTA Tasks 1, 2, 3) (Points)	3.2 Lessons for Diverse Learners (MoPTA Tasks 3, 4) (Points)	4.1 Instructional Strategies Leading to Student Engagement in Problem- Solving and Critical	5.1 Classroom Management Techniques (MoPTA Tasks 1, 4) (Points)	5.2 Management of Time, Space, Transitions, and Activities (MoPTA Task 4) (Points)	5.3 Classroom, School, and Community Culture (MoPTA Task 1) (Points)	6. Utilizing Effective Communication (Points)	6.1 Verbal and Non-Verbal Communication (MoPTA Task 4) (Points)	7.1 Effective Use of Assessments (MoPTA Task 2, 4) (Points)	7.2 Assessment Data to Improve Learning (MoPTA Tasks 1, 2) (Points)	7.5 Communication of Student Progress and Maintaining Records (MoPTA Task 2) (Points)	8.1 Self-Assessment and Improvement (MoPTA Tasks 2, 3, 4) (Points)	9.1 Induction and Collegial Activities (MoPTA Task 4) (Points)	9.3 Cooperative Partnerships in Support of Student Learning (MoPTA Tasks 1, 2, 4)
22	BA/BS	2	2	2	3	3	2	3	3	3	3	3	2	2	3	2	3	3
23	BA/BS	3	3	2	3	2	3	3	3	3	3	3	2	3	3	3	3	3
24	BA/BS	3	2	3	3	3	1	3	3	2	2	2	2	2	2	3	2	3
25	BA/BS	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3
26	MAT	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
27	BA/BS	2	2	2	3	3	3	3	3	2	2	2	2	2	2	3	2	2
28	MAT	2	2	2	3	2	2	2	2	2	3	3	2	2	2	3	2	2
29	BA/BS	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
30	BA/BS	2	3	2	2	2	2	2	2	2	2	2	2	1	2	2	2	2
31	BA/BS	2	3	3	3	3	3	2	3	3	3	2	3	2	3	3	3	3
32	BA/BS	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

MEES Raw Scores (Continued)

Participant Code	Degree you are seeking	1.1 Content Knowledge and Academic Language (MoPTA Task 4) (Points)	1.2 Student Engagement in Subject Matter (MoPTA Tasks 3, 4) (Points)	2.4 Differentiated Lesson Design (MoPTA Tasks 1, 2, 3, 4) (Points)	3.1 Implementation of Curriculum Standards (MoPTA Tasks 1, 2, 3) (Points)	3.2 Lessons for Diverse Learners (MoPTA Tasks 3, 4) (Points)	4.1 Instructional Strategies Leading to Student Engagement in Problem- Solving and Critical	5.1 Classroom Management Techniques (MoPTA Tasks 1, 4) (Points)	5.2 Management of Time, Space, Transitions, and Activities (MoPTA Task 4) (Points)	5.3 Classroom, School, and Community Culture (MoPTA Task 1) (Points)	6. Utilizing Effective Communication (Points)	6.1 Verbal and Non-Verbal Communication (MoPTA Task 4) (Points)	7.1 Effective Use of Assessments (MoPTA Task 2, 4) (Points)	7.2 Assessment Data to Improve Learning (MoPTA Tasks 1, 2) (Points)	7.5 Communication of Student Progress and Maintaining Records (MoPTA Task 2) (Points)	8.1 Self-Assessment and Improvement (MoPTA Tasks 2, 3, 4) (Points)	9.1 Induction and Collegial Activities (MoPTA Task 4) (Points)	9.3 Cooperative Partnerships in Support of Student Learning (MoPTA Tasks 1, 2, 4)
33	MAT	3	2	2	3	2	2	3	3	3	3	3	3	3	3	3	3	3
34	MAT	3	3	2	3	2	3	2	3	2	3	3	3	2	3	3	2	2
35	BA/BS	3	2	2	2	3	3	3	3	3	3	3	2	2	2	2	2	3
36	MAT	2	2	2	3	2	2	3	2	3	2	2	2	2	2	2	3	3
37	MAT	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
38	BA/BS	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
39	MAT	2	3	3	2	3	2	3	3	3	3	3	2	2	2	3	3	3
40	MAT																	
41	BA/BS	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
42	BA/BS	3	2	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2
43	MAT	3	3	3	3	3	2	3	3	3	2	2	3	3	3	3	3	3

MEES Raw Scores (Continued)

Participant Code	Degree you are seeking	1.1 Content Knowledge and Academic Language (MoPTA Task 4) (Points)	1.2 Student Engagement in Subject Matter (MoPTA Tasks 3, 4) (Points)	2.4 Differentiated Lesson Design (MoPTA Tasks 1, 2, 3, 4) (Points)	3.1 Implementation of Curriculum Standards (MoPTA Tasks 1, 2, 3) (Points)	3.2 Lessons for Diverse Learners (MoPTA Tasks 3, 4) (Points)	4.1 Instructional Strategies Leading to Student Engagement in Problem- Solving and Critical	5.1 Classroom Management Techniques (MoPTA Tasks 1, 4) (Points)	5.2 Management of Time, Space, Transitions, and Activities (MoPTA Task 4) (Points)	5.3 Classroom, School, and Community Culture (MoPTA Task 1) (Points)	6. Utilizing Effective Communication (Points)	6.1 Verbal and Non-Verbal Communication (MoPTA Task 4) (Points)	7.1 Effective Use of Assessments (MoPTA Task 2, 4) (Points)	7.2 Assessment Data to Improve Learning (MoPTA Tasks 1, 2) (Points)	7.5 Communication of Student Progress and Maintaining Records (MoPTA Task 2) (Points)	8.1 Self-Assessment and Improvement (MoPTA Tasks 2, 3, 4) (Points)	9.1 Induction and Collegial Activities (MoPTA Task 4) (Points)	9.3 Cooperative Partnerships in Support of Student Learning (MoPTA Tasks 1, 2, 4)
44	#N/A	3	3	3	3	2	3	3	3	3	3	3	2	2	2	3	3	3
45	#N/A	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
46	BA/BS	2	1	2	2	2	1	2	2	2	1	1	2	2	1	2	2	2
47	MAT	3	2	3	3	2	3	3	3	3	3	3	3	2	3	3	3	3

Appendix B

Equivalent Scale for Testing Instruments

Instrument	Scale	Equivalent scale
Lindenwood Teacher Education Exit Survey	0= Inadequately Prepared 1= Adequately Prepared 2= Well Prepared 3= Very Well Prepared	0 =Missing 1 =Inadequately Prepared 2 =Adequately Prepared 3 =Well Prepared 4 =Very Well Prepared
Missouri Educator Evaluation System (MEES)	**Baseline - 0**: the teacher candidate possesses the necessary knowledge but cannot apply or demonstrate the performance **Emerging - 1:** the teacher candidate possesses the necessary knowledge and inconsistently and somewhat effectively demonstrates the performance at the Emerging Level **Emerging - 2**: the teacher candidate possesses the necessary knowledge and consistently and effectively demonstrates the performance at the Emerging Level **Developing - 3**: the teacher candidate demonstrates consistently at the Emerging Level and is beginning to demonstrate at the Developing Level	0 =Missing 1 =Baseline 0 2 =Emerging 1 (inconsistent) 3 =Emerging 2 (consistent) 4 =Developing 3
Missouri Pre service Teacher Assessment Scores (MoPTA)Task 3	0=Missing 1=Minimal Evidence 2=Partial Evidence 3=Effective Evidence 4=Consistent Evidence	

Appendix C

Identified Items from Testing Instruments for Five Principles of DI

	MoPTA Items	**LEES Items**	**MEES Items**
Assessment	Task 2- You will demonstrate your understanding, analysis, and application of assessment and data collection to measure and inform student learning.	Item 31 on response sheet- I am prepared to help students enhance student communication skills through technology	Standard 7.1 Assessment Data to Improve Learning
Assessment	Task 2- You will demonstrate your understanding, analysis, and application of assessment and data collection to measure and inform student learning.	Item 35- I am prepared to help students set learning goals based on assessment results.	Standard 7.1 Assessment Data to Improve Learning
Curriculum	Task 3- You will demonstrate your ability to develop instruction, including the use of technology, to facilitate student learning.	Item 2- I am prepared to create lesson plans to engage all learners.	Standard 2.4- Differentiated Lesson Design
Curriculum	Task 3- You will demonstrate your ability to develop instruction, including the use of technology, to facilitate student learning.	Item 12- I am prepared to design lessons that include differentiated instruction.	Standard 2.4- Differentiated Lesson Design
Instruction	Task 3- You will demonstrate your ability to develop instruction, including the use of technology, to facilitate student learning.	Item 4- I am prepared to deliver lessons for diverse learners.	Standard 3.2- Implementation: Lessons for Diverse Learners
Instruction	Task 3- You will demonstrate your ability to develop instruction, including the use of technology, to facilitate student learning.	Item 5- I am prepared to implement a variety of instructional strategies.	Standard 4.1- Instructional Strategies Leading to Student Engagement in Problem- Solving and Critical Thinking

Identified Items from Testing Instruments for Five Principles of DI Continued

	MoPTA Items	**LEES Items**	**MEES Items**
Instruction	Task 3- You will demonstrate your ability to develop instruction, including the use of technology, to facilitate student learning.	Item 6- I am prepared to engage students in critical thinking.	Standard 4.1- Instructional Strategies Leading to Student Engagement in Problem- Solving and Critical Thinking
Instruction	Task 3- You will demonstrate your ability to develop instruction, including the use of technology, to facilitate student learning.	Item 7- I am prepared to model critical thinking and problem solving.	Standard 4.1- Instructional Strategies Leading to Student Engagement in Problem- Solving and Critical Thinking
Instruction	Task 3- You will demonstrate your ability to develop instruction, including the use of technology, to facilitate student learning.	Item 13- I am prepared to implement instruction based on a student's IEP.	Standard 3.2- Implementation: Lessons for Diverse Learners
Instruction	Task 3- You will demonstrate your ability to develop instruction, including the use of technology, to facilitate student learning.	Item 14- I am prepared to modify instruction for English language learners.	Standard 3.2- Implementation: Lessons for Diverse Learners
Instruction	Task 3- You will demonstrate your ability to develop instruction, including the use of technology, to facilitate student learning.	Item 15- I am prepared to modify instruction for gifted learners.	Standard 3.2- Implementation: Lessons for Diverse Learners
Leadership	Task 3- You will demonstrate your ability to develop instruction, including the use of technology, to facilitate student learning.	Item 17- I am prepared to use a variety of management strategies.	Standard 5.3 Management of Time, Space, Transitions, and Activities

Identified Items from Testing Instruments for Five Principles of DI

	MoPTA Items	**LEES Items**	**MEES Items**
Leadership	Task 3- You will demonstrate your ability to develop instruction, including the use of technology, to facilitate student learning.	Item 21- I am prepared to facilitate smooth transitions for my students.	Standard 5.3 Management of Time, Space, Transitions, and Activities
Learning Environment	Task 1- you will demonstrate the knowledge and skills that pertain to your understanding of the context of your classroom in regard to your students, the school, and the community; and you will identify implications of these factors on instruction and student learning.	Item 16- I am prepared to create a classroom environment that encourages student engagement.	Standard 5.3 Classroom, School, and Community Culture
Learning Environment	Task 1- you will demonstrate the knowledge and skills that pertain to your understanding of the context of your classroom in regard to your students, the school, and the community; and you will identify implications of these factors on instruction and student learning.	Item 20- I am prepared to foster positive student relationships.	Standard 6.2 Verbal and Non-Verbal Communication
Learning Environment	Task 1- you will demonstrate the knowledge and skills that pertain to your understanding of the context of your classroom in regard to your students, the school, and the community; and you will identify implications of these factors on instruction and student learning.	Item 22- I am prepared to use effective communication strategies to foster learning.	Standard 6.2 Verbal and Non-Verbal Communication
Learning Environment	Task 1- you will demonstrate the knowledge and skills that pertain to your understanding of the context of your classroom in regard to your students, the school, and the community; and you will identify implications of these factors on instruction and student learning.	Item 25- I am prepared to promote respect for diverse cultures, genders, and intellectual/physical abilities	Standard 5.3 Classroom, School, and Community Culture

Appendix D

Qualitative Scoring Rubric for Artifacts

Key DI Principles	Inadequately Prepared	Adequately Prepared	Well Prepared	Very Well Prepared
Learning Environment	Teacher structures classroom learning environment to build positive student relationships and culture.	Teacher encourages positive student relationships and mutual respect and structures the environment to enhance learning.	Teacher positively impacts learning by creating a classroom environment characterized by positive student relationships and mutual respect.	Teacher engages students in forming the classroom environment based on the culture of school and community.
Curriculum	Teacher designs lessons based on students' prior experiences, learning styles, multiple intelligences, strengths, and needs.	Teacher creates lessons that address the individual needs of all learners and variation in prior knowledge and experiences, multiple intelligences, strengths and needs.	Teacher plans lessons that will engage and advance each student where they are developmentally, cognitively, physically, and effectively.	Teacher modifies lessons design as needed to address the individual needs of all learners and actively involves every student in the advancement of their own learning.
Assessment	Teacher collects information through observation of classroom interactions, higher order questioning, and analysis of student work.	Teacher uses data and information to reflect on and plan for future lessons, adjusting and modifying instruction as necessary.	Teacher modifies the instructional design based on observational data and data from previous learning then monitors to confirm impact of adjustments.	Teacher engages in ongoing assessment of progress of individual students and whole class in order to advance each individual's learning goals and can model the instructional uses of data for others.

Qualitative Scoring Rubric for Artifacts Continued

Key DI Principles	**Inadequately Prepared**	**Adequately Prepared**	**Well Prepared**	**Very Well Prepared**
Instruction	Teacher selects various types of instructional strategies and appropriate resources to achieve instructional goals and teach students critical thinking.	Teacher ensures student growth with frequent instructional opportunities to engage in critical thinking and problem-solving.	Teacher effectively applies a range of instructional techniques that require students to think critically and problem solve.	Teacher fluently uses a range of instructional techniques that require students to think critically and problem solve and serve as a leader by offering constructive assistance in the use of strategies, materials, and technology for critical thinking.
Leadership	Teacher designs routines that support the effective management of time, space, transitions, and activities.	Teacher consistently designs and implements routines and structures to support effective management of time, space, transitions and activities.	Teacher continuously and effectively implements routines and structures to skillfully and effectively manage time, space, transitions, and activities.	Teacher routines and structures are effectively modified based on student need and input.

Appendix E

Qualitative Versus Quantitative Data for Five Principles of DI

Learning Environment		Curriculum		Assessment	
Quantitative	Qualitative	Quantitative	Qualitative	Quantitative	Qualitative
3.25	3	2.83333333	2.5	3.5	3
3.5	3	3.30583333	2	3.55555556	3
3.835	3.5	3.39	2.5	3.22111111	3
3.04166667	3	2.48694444	1.5	2.79666667	2.5
3.25	3	3.33333333	3	3.38888889	3
3.83333333	4	3.68055556	3.5	3.77777778	3.5
4	2.5	3.66666667	3	3.55555556	2
4	4	3.66666667	3	3.66666667	3
3.25	2	3	3	3.11111111	3
3.08333333	3	2.80555556	2.5	3.11111111	3
3.45833333	3	3.59722222	3	3.72222222	3.5
4	4	3.45833333	3	3.61111111	3.5
3.66666667	4	3.11111111	3.5	3.55555556	3
3.75	3	3.29166667	2.5	3.44444444	3.5
3.75	3	3.5	3	3.55555556	3
3.375	3	3.04166667	3	3.44444444	3
3.54166667	3	2.98611111	3	3.5	3
3.83333333	4	3.51388889	3	3.61111111	3.5
3.25	3	3.08333333	3	2.57444444	1.5
3.58333333	3	3.43055556	3	3.61111111	4
3.83333333	3	3.51388889	3	3.72222222	3
3	2.5	3.04166667	2	1.72222222	3
3.375	3	3.41666667	2	3	2.5
3.875	3.5	3.66666667	3.5	3.83333333	4
3.375	3	3.33333333	3	3.27777778	2
3.875	3	3.58333333	2.5	3.38888889	2.5

Instruction	
Quantitative	Qualitative
2.95238095	3
3.30583333	3
3.2947619	3
2.51075397	3
3.21428571	3
3.53769841	3
3.66666667	4
3.66666667	3.5
3.02380952	3
2.92460317	2.5
2.9781746	2.5
3.33928571	4
3.23015873	3
3.19642857	3
3.4047619	3
3.25595238	3
3.12896825	3
3.3234127	3
3.08333333	3
3.35912698	3.5
3.2281746	3
2.54166667	3.5
3.17857143	3.5
3.54761905	3.5
3.21428571	3
3.58333333	4

Leadership	
Quantitative	Qualitative
3.33333333	3
3.30583333	3
3.39	3
2.32027778	2
3.5	3
3.51388889	3.5
3.66666667	3.5
3.66666667	3.5
3.16666667	3
2.80555556	2
3.43055556	3
3.625	3.5
3.11111111	3
3.29166667	3
3.5	4
3.375	3
3.15277778	3
3.51388889	3.5
3.08333333	3
3.43055556	3.5
3.34722222	3
2.54166667	3
3.08333333	3
3.83333333	3.5
3.33333333	3
3.58333333	3