University Instructors' Responses on Implementation of Differentiated Instruction in Teacher Education Programs

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2017

Abstract

General education teachers are encouraged in many teacher education programs to differentiate instruction. The question was if instructors in teacher education programs modeled differentiated instruction (DI) in their teacher education programs. University instructors in teacher education programs were surveyed about their use of DI. DI included different variables related to preassessment for student learning preferences, strengths, and content, use of differing teaching methodologies and assessing. Fewer than half who responded preassessed their students for their learning preferences, strengths, and content knowledge. Almost all participants responded they differentiated the way they taught course material, their methodology. About half indicated differentiating the way they assessed. Qualitative responses indicate instructors noted an importance of modeling the use of DI in a teacher education program, but that they struggled with implementing it themselves. They also indicated it was easier to implement DI in a methods (pedagogy) course than in content (e.g., mathematics, English) courses. Overall, participants did utilize DI in their teacher education program on some level.

Abbreviations:

- Differentiated Instruction (DI)
- Preschool through 12th grade (P12)
- Institution of Higher Learning (IHL)
- Higher Education

Introduction

Although considerable research on differentiated instruction (DI) has been reported for elementary and secondary levels, research related to DI at the postsecondary level and specifically in teacher education programs is scarce (Dosch & Zidon, 2014; Gould, 2004; Santangelo & Tomlinson, 2009; Tomlinson, 1999; Tulbure, 2011a; Tulbure 2011b). DeJesus (2012) noted what many in education believe that teachers have a commitment to educate all children in a preschool through 12th grade (P12) setting; and with that commitment comes the challenge of meeting high stakes accountability standards in the United States (US) while catering to the instructional needs and abilities of students with diverse needs. Often, P12 classrooms are filled with students from different cultural backgrounds who have unique interests and learning strengths. The decision of how to respond to these academically diverse populations can be a struggle for many educators (Chamberlin, 2011). According to Chamberlin and Powers (2010), though research in regards to academic preparation and remedial education are ample, there is limited research on DI to meet the diverse instructional needs of college students who are in teacher education programs. How is DI being utilized in teacher education courses if it is really being consciously used at all? It may seem logical to some that if P12 teachers in the US are being evaluated on their use of DI with P12 students, might college instructors need to model DI in their own practices teaching preservice P12 teachers? What if some instructors are already doing that? The purpose of this research was to examine perceptions of instructors who teach at an institution of higher learning (IHL) in teacher education programs, either undergraduate or master's level, about their DI practices (if any). An examination was made about DI practices on five different components of DI. Those five separate constructs included regarding preassessment (students' learning preferences, strengths,

and initial content knowledge), course content, process (teaching methodology), and product (assessment). The survey is provided with each of the five separate subsections (see Appendix A). Before actually conducting research on the effectiveness of DI use in teacher education programs, the first step was to actually examine if DI was being modeled and/or used by instructors specifically who taught in teacher education programs.

DI can be a complex concept to define since there are several components to DI, and there are different definitions provided. DI is a proactive method to maximize students' learning potential, adapt curriculum and teaching practices, and accommodate the various learning needs of students (DeJesus, 2012; Tomlinson, 1999; Tomlinson, 2005). DI is a manner of a teacher responding to needs of individual students within the class (Stanford, Crowe, & Flice, 2010). Pham (2012) noted that rather than being defined by a specific strategy, DI is an eclectic compilation of various strategies and practices used to modify instruction in order to best fit the needs of all learners within a classroom. Rock, Gregg, Ellis, and Gable (2008) noted that multiple strategies should be utilized to create successful learning for all students. Some have indicated that students learn best when effective teachers utilize DI in the classroom (Rock, Gregg, Ellis, & Gable, 2008; Wormeli, 2011).

It has been indicated that although some research supports DI in the classroom, some instructors in teacher educator programs still teach and evaluate all students using the same, more traditional teaching methods such as lecture, failing to provide current and prospective teachers the opportunity to fully experience DI while in their teacher education programs (Dosch & Zidon, 2014; Ernst & Ernst, 2005; Gould, 2004; Joseph, Thomas, Simonette, & Ramsook, 2013; Tulbure, 2011a; Tulbure, 2011b). In other words, instructors in teacher education programs may not be modeling the use of DI. Logan (2011) found that preservice teachers who

did not have DI modeled for them in their teacher education programs failed to have a clear understanding of how to implement DI in their own classrooms once they began teaching in the P12 setting. Teacher candidates have praised the opportunity to observe DI firsthand, and that the experiences of having DI modeled for them in their teacher education programs provided a better understanding of how to adjust instruction according to student readiness and implement DI in their own P12 classrooms once they began teaching (Chamberlin, 2011; Chamberlin & Powers, 2010; Sands & Barker, 2004).

Ernst and Ernst (2005) wrote, "College instruction remains dominated by a one-size fits all approach to teaching (i.e., lecture format augmented by discussion groups) that serves as a poor reflection of the diverse student bodies that professors are increasingly called on to serve" (p. 40). Joseph, Thomas, Simonette, and Ramsook (2013) acknowledged that teacher candidates were taught DI strategies in their courses; however knowing how to effectively differentiate learning objectives, curriculum, teaching methods, and assessment in the classroom was still quite challenging for their teacher candidates. Gould (2004) overtly noted that college professors must demonstrate the components of DI in their courses to allow educators to not only witness, but encounter DI through effective modeling of differentiated teaching, lessons, activities, and assessments. Perhaps instructors should be modeling DI in teacher preparation programs. The perspective of this research was not to examine the use of DI in all college preparation programs. There are instructors on the college level who may not have been exposed to DI, and even if they were, there really is no evidence to support the implementation of DI on the college level.

With the findings of Chamberlin (2011), Chamberlin and Powers (2010), Sands and Barker (2004) on preservice teachers being appreciative of having DI modeled for them during

their teacher education program, an examination was conducted about if college instructors in teacher education programs were modeling DI for their preservice teachers.

Differentiated Instruction in Higher Education

There is a distinct absence of ample research on the use and implementation of DI in higher education courses (Chamberlin & Powers, 2010Dosch & Zidon, 2014; Ernst & Ernst, 2005; Gould, 2004; Joseph et al., 2013; Santangelo & Tomlinson, 2009; Tomlinson, 1999; Tulbure, 2011a; Tulbure, 2011b). The topic of DI on the college level can be a controversial topic (Tulbure, 2011a, 2011b). Tulbure (2011b) wrote, "On the whole, differentiated instruction in higher education stands as a challenge both for teachers and researchers. To demonstrate the superiority of this approach over the whole-class instruction we still need a great amount of empirical proof" (p. 82). Tulbure (2011b) provided a table with a list of empirical studies that either were supportive of or refuted the use of DI on the college level, and there were more studies showing positive results of using DI. However, Tulbure (2011b) interchanged learning styles and DI making it difficult to ascertain if DI use was really the independent variable instead of learning styles.

It is difficult to differentiate learning style research from DI, since DI incorporates the component of process/methodology. Process is methodology, the way information is taught. Process can incorporate the concepts of many different definitions of learning styles. Dosch and Zidon (2014) wrote, "With so little research on differentiated instruction at the higher education level, further studies are needed to gauge the impact of this educational approach on college students' academic success" (p. 346). There are only a few examinations of DI on the college level within teacher preparation programs (Dosch & Zidon, 2014; Livingston, 2005; Santangelo

& Tomlinson, 2009). Chamberlin and Powers (2010) conducted research with preservice teachers, but the course was a freshman level math course.

There have also been mixed results in some research on DI use on the college level even when overall findings were positive. Tulbure (2011a) wrote that "… results are controversial and sometimes contradictory" (p. 449). Tulbure did find that there were differences within subjects, but not between groups, and Tulbure also found that students who received whole-group instruction did just as well as those who received DI. Dosch and Zidon's (2014) main findings were in support of DI for most assessments. However, there were some assessments that showed there were no statistically significant differences between the DI group and the group that did not receive DI. Dosch and Zidon wrote that DI was "a mindset that all learners respond to instruction differently" (p. 344). Dosch and Zidon provided a complex explanation of DI including variables of formative components, content, proc3ess, product, and affect. Each of those components included specific variables for consideration as well. For two assessments, the group that did not receive DI actually did better, with one group showing a statistically significant difference and the other not. Overall, Dosch and Zidon reported that students very much preferred the use of DI and were very satisfied with the college instructor using DI.

According to some previous research, college students who participated in DI classes or experiences excelled more than comparable students in traditional courses/teaching approaches; and overall, students applauded the element of choice, opportunity for deeper learning, value of collaborative groups, and the success of more stimulating learning experiences (Butler & Lowe, 2010; Chamberlin, 2011; Chamberlin & Powers, 2010; Dosch & Zidon, 2014; Ernst & Ernst, 2005; Huss-Keeler & Brown, 2007; Joseph et al., 2013; Livingston, 2005; Sands & Barker, 2004; Varasavsky & Rayner, 2013). Teacher candidates praised the opportunity to observe DI

firsthand, and that the experiences provided a better understanding of how to adjust instruction according to student readiness and implement DI in their own classrooms (Chamberlin, 2011; Chamberlin & Powers, 2010; Sands & Barker, 2004). Some of the limited number of studies that have been conducted did reveal that students genuinely enjoyed and benefited from differentiated instructional approaches and class experiences (Butler & Lowe, 2010; Chamberlin, 2011; Chamberlin & Powers, 2010; Dosch & Zidon, 2014; Ernst & Ernst, 2005; Huss-Keeler & Brown, 2007; Joseph et al., 2013; Livingston, 2005; Sands & Barker, 2004; Tulbure, 2011b; Varasavsky & Rayner, 2013).

Neuromythologies. Geake (2008) and Howard-Jones (2014) have written about what they refer to as "neuromythologies." They argued that many in education have misunderstood, misinterpreted, and misused neuroscience findings. They did not specifically discuss DI, but mentioned 10% brain usage, multiple intelligences, learning styles pertaining to visual, auditory, and kinesthetic (VAK), and right- and left-brained learning. Both provided arguments that there is basically no real empirical evidence for what they refer to as myths about how the brain works in relation to learning. Although the focus of this research was not about those particular learning theories noted by Geake and Howard-Jones, it is worth noting that there are those such as Geake and Howard-Jones who do not support any of these particular theories and do provide argument that there is no empirical evidence in support of their use in the classroom. Geake and Howard-Jones explained that the brain is extremely complex and interconnected. Geake wrote "…neuromythologies and possible reasons for their widespread acceptance has become a matter for investigation itself" (p. 124). Howard-Jones noted that "…it is true that there may be preferences and, perhaps more importantly, that presenting information in multiple sensory

modes can support learning" (p. 818). DI may be a way of examining how to best teach in terms of preassessing, methodology, and assessment.

Challenges in Higher Education

Although most teachers can identify learning needs of students, the challenge may be with altering instructional practices to address learners' differences. According to Logan (2011), limited teacher experiences with DI correlated with an unclear understanding of what differentiation looked like in action, how to assess students' readiness levels, and how to match appropriate resources with teaching. It is often noted that many teachers simply teach the way they were taught. Although some teachers may try to change their method of instruction to accommodate learners, those teachers are sometimes faced with discouragement from colleagues and administrators, and are too often encouraged to teach to a state test and to keep their students on the same level**.** Even though teachers are expected to teach using a variety of research-based methods, perhaps teachers have not experienced DI for themselves or seen DI modeled, so perhaps they really do not know what DI actually looks like in a classroom**.** It does seem important for those who teach in teacher education programs to best prepare prospective and current teachers to implement effective, empirically-based best practices. However, first there much be an examination as to whether or not instructors in teacher education programs are using DI.

Teacher educators at IHLs are also often faced with similar obstacles when trying to implement DI. According to Griess and Keat (2014), university policies, requirements for accreditation (e.g., key assessments), class size, type of course (e.g., methods, content, online), and teacher candidates' content knowledge readiness can often hinder meaningful implementation of DI. Unlike P12 teachers, teacher educators typically have a limited amount of

contact hours with students, and that can make it unrealistic to become familiar with and meet students' learning needs on a more individualized level. Depending on the number of students and type of course, planning and implementing DI effectively acquires a huge amount of time, and many teacher educators also have additional other professional responsibilities including research and service (Ernst & Ernst, 2005). Some teacher educators may also struggle with relinquishing control over the traditional routine of the college professor being the supplier of knowledge instead of the facilitator of learning (Sands & Barker, 2004). Creating different assignments can be challenging for some educators, but creating differentiated assignments could be manageable if one is appropriately organized. Differentiated assignments allow student teachers to assimilate conceptual knowledge while utilizing collaborative practices and applying new knowledge to practical situations. According to Pham (2012), teaching strategies such as DI help "promote learning experiences and student interests in understanding how things are related with theories and how the combined theories and practices work together" (p. 17).

Since all students regardless of their aptitude level are included in P12 settings and with most of those students spending most of their time in a general education classroom, it can be a daunting task for many P12 teachers to meet all of their students' academic, social, and emotional needs. In order to better prepare teachers to differentiate instruction for diverse learners, Goodnough (2010) noted that instructors who teach in teacher education programs need to help teacher candidates develop appropriate DI abilities that will allow them to effectively teach all students. Although many teacher education programs align their program outcomes with national teacher standards, Tomlinson (1999) contended that many programs do not adequately prepare educators to teach diverse populations since teacher candidates rarely experience DI within their teacher education program. Teacher educators modeling DI in higher

education may allow teacher candidates to see the very concepts and behaviors many college professors encourage them to practice. Coupling that with the experience of DI could then increase teacher candidates' understanding of the effectiveness of the DI approach and then increase the likelihood of those candidates to incorporate DI in their own classrooms (Griess & Keat, 2014).

Very little research has been found showing the efficacy or just the use of DI within IHLs (Chamberlin & Powers, 2010; Dosch & Zidon, 2014; Gould, 2004; Santangelo & Tomlinson, 2009; Tomlinson, 1999; Tulbure, 2011a; Tulbure 2011b). First, an examination should be made into whether or not instructors in teacher education programs are actually utilizing DI with their own students. Are instructors actually practicing what they preach about DI? Are they modeling DI for their students in their teacher education programs? If they are, then perhaps later more research can be conducted concerning the efficacy of DI use on an IHL level.

Method

Participant Protection, Participants, Sampling, and Procedure

Potential participants were sent an email containing pertinent cover-letter information along with an electronic survey link. Participants' responses were completely anonymous. Participants were instructors for preservice teachers in a P12 teacher education program at four-year plus IHLs. The programs included both undergraduate and master-level teacher education.

Snowball sampling was used. Online surveys were distributed by the researchers to others they knew who taught in P12 teacher education programs, and those instructors were asked to forward to the email to those they knew who also taught in P12 teacher education programs. Potential participants were asked to complete and submit the survey before an ending closing date. Since snowball sampling was used, the survey was available for one month, and

reminders were not sent. At the end of the data collection period the survey was closed, data were downloaded, and then analyzed.

Instrument

Survey. A survey (see Appendix A) was used to obtain data on the perceptions of instructors concerning their use of DI in their teacher education program. The survey was provided in an online format using an online survey provider. Questions were related to instructors' knowledge and use of differentiated instruction in their teacher education programs.

The survey was developed because no other instrument could be found that measures DI assessment specifically for instructors who teach in teacher preparation programs on the college level. There were five main components developed (Dosch & Zidon, 2014; Tomlinson, 2001; Tomlinson & Allan, 2000, Tomlinson & Imbeau, 2010). Those five overall components were preassessment for student learning preferences, preassessment for student learning strengths, content, process/methodology, and product/assessment. Individual items were then examined and categorized into one of the five components (Dosch & Zidon, 2014; Tomlinson, 2001; Tomlinson & Allan, 2000, Tomlinson & Imbeau, 2010).

For the purpose of analysis, overall construct means were calculated by averaging together each participant's responses of the Likert-type items for each of five constructs. Each participant's overall construct means were used in the statistical comparisons.

There was an open-ended question provided on the survey to allow participants to elaborate or make a comment. Those data were examined using open coding. Content analysis was used as well to find any themes or categories.

Validity and Reliability. In addition to developing the five main components based on literature (Dosch & Zidon, 2014; Tomlinson, 2001; Tomlinson & Allan, 2000, Tomlinson &

Imbeau, 2010), the instrument was reviewed by six experts. These six were experienced educators at IHLs in teacher education programs who were familiar with DI, the literature on DI, and taught DI to preservice teachers.

A reliability analysis was run for the Likert-type items measuring each of the constructs measured in this study for internal validity. The five components were preassessment for student learning styles and student learning preferences, differentiating content, differentiating process/methodology, and differentiating product/assessment. Preassessment for student learning preferences had a Cronbach's alpha of .938 and preassessment for student learning strengths had a Cronbach's alpha of .968. Differentiating content had a Cronbach's alpha of .794. Differentiating process/methods had a Cronbach's alpha of .712. The last construct measured, product/assessment, had a Cronbach's alpha of .683.

Results

Demographics

One-hundred thirty participants chose to complete the online questionnaire. There were 90 (69.2%) respondents who were from public institutions, and 26 (20.0%) who were from a private institutions. Sixty-three (55.8%) reported having 10 or fewer years of teaching experience while 50 (44.2%) reported having 11 or more years of teaching experience. Twenty (18.2%) of the respondents classified themselves and male, and 90 (81.8%) classified themselves as female. The minimum age of respondents was 32, and the maximum age reported was 70 with the mean at 50.1 years of age with a standard deviation of 10.8. The most frequently reported ethnicity was Caucasian (n = 100, 88.5%), followed by African-American (n = 8, 7.1%). Ninety-one (81.3%) of the respondents reported having earned a doctorate.

Descriptive Analysis

Out of all who responded to the survey, 41.1% (n = 46) responded "yes" when asked if they asked their students how they preferred to learn. Only those who responded "yes" to this question were routed to Likert-type items used to measure the way instructors assess for students' learning preferences. Means and standard deviations were calculated for the Likert-type items concerning preassessment for learning preferences (see Table 1).

Table 1

Means and Standard Deviations for Questions: Preassessment for Learning Preferences

Questions	*n*	*M*	*SD*
I ask students if they prefer to learn best			
in groups	43	3.35	0.75
alone	42	3.31	0.78
with one other person (as with a peer)	42	3.29	0.81
with technology	40	3.00	0.53
having paper copy of notes to use as a guide	40	2.75	0.93
using media on a projector in front of class to use as a guide	40	2.88	1.06
presenting material to the class	43	2.86	1.07
from instructor lecture	41	2.85	1.04
sitting in a comfortable chair	39	1.79	1.17
listening	43	3.28	1.15
reading	43	3.14	0.80
doing	43	3.30	0.89
with music playing in the background	41	2.15	0.80
reading material before coming to class	40	2.68	1.32

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree

Out of all who responded to the survey, 41.1% (n = 46) responded "yes" when asked if they asked their students about students' learning strengths. Only those who responded "yes" to this question were routed to Likert-type items used to measure the way instructors assess for students' learning strengths. Means and standard deviations were calculated for the Likert-type items concerning students' strengths (see Table 2).

Table 2

Means and Standard Deviations for Questions: Students' Strengths

Questions	*n*	*M*	*SD*
I ask students about their strengths in			
Language - Speaking	41	2.78	1.19
Language - Reading	42	2.68	1.17
Language - Writing	42	2.90	1.19
Logical/Mathematical	41	2.80	1.23
Spatial Ability	40	2.73	1.20
Interpersonal Skills (Leadership Ability)	42	3.07	1.14
Intrapersonal Skills	42	3.00	1.17
Musical Ability	42	2.69	1.24
Physical Ability	42	2.67	1.20
Science Ability	41	2.39	1.30
Perseverance Skills	40	2.45	1.29
Organizational Skills	41	2.71	1.19

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree

Out of all who responded to the survey, 76.4% (*n* = 84) responded "yes" when asked if they differentiate course content. Only those who responded "yes" to this question were routed to Likert-type items used to measure the way instructors differentiate their course content. Means and standard deviations were calculated for the Likert-type items concerning differentiating content (see Table 3).

Table 3

Means and Standard Deviations for Likert Statements: Differentiating Content

Statements	*n*	*M*	*SD*
I preassess students about what they want to learn from the course	82	2.70	1.23
I preassess students about their interests	83	2.83	1.05
I initially provide course objectives (specific learning outcomes) to the students	82	3.88	0.40
I teach the same content to all students in a course	83	1.72	0.83
I provide students a choice for learning different course objectives	83	2.24	1.15
I preassess students on prior relevant content knowledge (specific learning outcomes)	83	2.71	1.09
I offer mini lessons at varied levels for students who already have mastered some of the course content	83	2.06	1.05
I allow students to choose their own readings for at least one assignment	82	3.04	1.12
I allow students to choose their own topic for a a particular assignment	83	3.43	0.79
I provide students tiered content	82	2.50	1.03
I omit covering some material if students exhibit already having knowledge of content	82	3.01	0.98
I provide opportunities for students to learn additional content if they are interested in learning more content	83	3.47	0.76
I provide opportunities for students to learn additional content if they are moving at a faster pace than other students	83	3.06	0.97
I embed students' special interests in content	83	3.12	0.82

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree

Out of all who responded to the survey, 95% (n = 102) responded “yes” when asked if they differentiate process (teaching methods). Only those who responded “yes” to this question were routed to Likert-type items used to measure the way instructors differentiate process (teaching methods). Means and standard deviations were calculated for the Likert-type items concerning differentiating process (teaching methods) (see Table 4).

Table 4

Means and Standard Deviations for Likert Statements: Differentiating Process

Statements	*n*	*M*	*SD*
I teach using lecture	102	3.04	0.80
I use the Socratic method (questioning/debate)	101	2.52	0.82
I provide some type of electronic information guide (e.g., PowerPoint) provided to students to print before class to use as a guide during class	102	3.04	1.13
I provide some type of electronic information guide (e.g., PowerPoint) projected in front of the class to use as a guide during class	102	3.35	0.88
I use supplementary resources (not just a textbook)	102	3.69	0.53
I use an electronic learning management system (e.g., Desire to Learn, Blackboard)	101	3.65	0.73
I teach closely following a textbook	101	3.36	0.77
I regularly change my teaching methodology (other than using lecture only)	102	3.46	0.67
I base my teaching methodology on student learning preferences	101	2.59	0.93
I typically utilize more than one teaching methodology in one class period	100	3.55	0.59
I utilize current technology to teach lessons (e.g., interactive white boards, student response systems, Web 2.0)	102	2.90	1.10
I group students for cooperative learning opportunities	102	3.35	0.74
I provide peer tutoring opportunities	101	2.51	1.08
I use worksheets	100	3.60	0.65
I work with students one-on-one	102	2.69	0.80
I encourage students to utilize student support (e.g., tutoring) at my institution of higher learning	102	2.97	0.88
I rearrange the furniture in a classroom (e.g., tables, seats, for individual seating or small group) to facilitate learning	1.02	3.02	1.04

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree

Out of all who responded to the survey, 56.2% (n = 73) responded “yes” when asked if they differentiate product (assessment). Only those who responded “yes” to this question were routed to Likert-type items used to measure the way instructors differentiate product (assessment). Means and standard deviations were calculated for the Likert-type items concerning differentiating product (assessment) (see Table 5).

Table 5

Means and Standard Deviations for Likert Statements: Differentiating Product (Assessment)

Statements	*n*	*M*	*SD*
I assess content the same way for all students in the same course	71	2.39	0.87
I provide students with assessment options, but assess the same objectives	70	2.74	0.99
I provide a variety of grading assessment tools (e.g., rubrics, grading scales, grading criteria) to students before they are assessed	70	3.71	0.54
I use technology to assess students	70	3.03	0.96
I utilize portfolio assessment	70	2.76	1.05
I utilize performance assessment	69	3.28	0.73
I utilize pencil-paper type assessment	70	3.27	0.85
I assess using an online learning management system (e.g., Desire to Learn, Blackboard)	70	2.90	1.09
I have students present material using a method of their own choice in front of the class.	70	3.19	0.97

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree

5.2 Statistical Analysis

First, independent samples *t* tests were run to test for significant differences between respondents of public and private institutions for each of the five constructs (Preasssement of students' learning preferences, preassessment of students' learning strengths, content, process, and product (assessment). There were no statistically significant differences found between public and private for any of the five constructs. Means and standard deviations for public and private are provided (see Table 6).

Table 6

Means and Standard Deviations for Comparisons of Public and Private Institutions with Constructs

	Public			Private		
Constructs	*n*	*M*	*SD*	*n*	*M*	*SD*
Preassessment for Learning Preferences	30	2.89	0.78	11	2.95	0.69
Preassessment for Learning Strengths	30	2.76	1.06	11	2.70	1.01
Differentiating for Content	79	2.79	0.53	21	3.00	0.44
Differentiating for Process	79	3.13	0.36	22	3.16	0.34
Differentiating for Product (Assessment)	52	3.03	0.50	18	3.02	0.46

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree

Next, statistical comparisons were run to test for statistically significant difference between years of teaching experience for each of the five constructs. No statistically significant differences were found. Means and standard deviations for years of teaching experience are provided (see Table 7).

Table 7

Means and Standard Deviations for Comparisons of Years of Teaching with Constructs

	10 or fewer			11 or more		
Constructs	*n*	*M*	*SD*	*n*	*M*	*SD*
Preassessment for Learning Preferences	21	2.91	0.81	19	2.87	0.69
Preassessment for Learning Strengths	21	2.84	1.09	20	2.65	1.00
Differentiating for Content	44	2.83	0.55	37	2.85	0.48
Differentiating for Process	58	3.10	0.36	40	3.17	0.35
Differentiating for Product (Assessment)	41	3.01	0.50	27	3.06	0.49

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree

Statistical comparisons were also run to test for a statistically significant difference between males and females for each of the five constructs. Due to the low numbers of male participants, comparisons could only be run for differentiating content and differentiating process (teaching methods). There was a statistically significant difference between males ($M = 2.56$, $n = 14$) and females ($M = 2.91$, $n = 67$) for differentiating content, $t(79) = -2.392$, $p = .019$. Although Levene's test showed no homogeneity of variance issues ($p = .335$), it should be noted that there were 14 male participants and 67 female participants in the comparison. Results of the independent samples *t* test were still statistically significant when degrees of freedom were adjusted ($p = .015$). Cohen's effect size value ($d = .739$) suggested moderate to high practical significance. There was no statistically significant difference found between males and females for differentiating process (teaching methods). Means and standard deviations are provided (see Table 8). GET WITH JALYNN ABOUT THE MALES AND FEMALES COMMENT B/C N WAS SO LOW.

Table 8

Means and Standard Deviations for Comparisons of Males and Females for Constructs

	Males			Females		
Constructs	*n*	*M*	*SD*	*n*	*M*	*SD*
Preassessment for Learning Preferences	3	3.24	0.25	38	2.88	0.77
Preassessment for Learning Strengths	4	3.73	0.23	37	2.64	1.04
*Differentiating for Content	14	2.56	0.47	67	2.91	0.51
Differentiating for Process	18	3.05	0.33	80	3.16	0.36
Differentiating for Product (Assessment)	7	3.10	0.62	63	3.02	0.48

Note. 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree

* $p < .05$ Significant difference

Lastly, Pearson correlations were run between age and each of the five constructs measured. No statistically significant correlations were found. Data are provided for correlations of age with each of the five constructs (see Table 9).

Table 9

Correlation Data for Participants' Age with Constructs

Construct	*n*	*r*	*p*
Preassessment for Learning Preferences	38	.097	.562
Preassessment for Learning Strengths	38	.028	.867
Differentiating for Content	79	.102	.369
Differentiating for Process	97	.167	.102
Differentiating for Product (Assessment)	67	.017	.890

5.4 Qualitative Analysis of Open-ended Option

The open-ended question response data were analyzed and interpreted using open coding. Open coding is the process to define and label textual response data into meaningful categories and concepts (Khandkar, 2009). To ensure interrater reliability, two researchers coded responses individually and then calibrated codes for consistency. There was a 95% agreement in consistency of coding categories. Once final categories were determined, data were input into NVivo 10 to be reevaluated and further analyzed.

Major results of the open coding analysis of the 37 open responses that addressed comments, questions, and/or concerns of differentiating instruction at the college/university level are provided (see Table 10). Four superordinate and 17 subordinate categories that emerged from the textual responses can be seen (see Table 10). The responses revealed that participants understood the importance of DI, but struggled with how to implement DI effectively based on type of course and institutional input (regulations). Respondents emphasized that it was easier to implement DI in methods courses rather than online and content courses. Some responses included:

- "I teach my methods courses very differently than my content courses… I would respond very differently for my 2 different content courses… because they have different purposes,"
- In general, the content of the course is something that would have been difficult to have been learned anywhere else – while preservice teachers have been learners, they have limited exposure to the 'behind the scenes' of teaching, and so rarely have had opportunities to learn what I am teaching prior to class,
- "I teach 100% online... some of the questions are not applicable to teaching in a 100% online program."

Institutional demands (workload, class size, inflexible curriculum) also were noted as interfering with how much and ways DI could be utilized in the college classroom. Responses aligned with how DI is employed and the challenges that prevent instructors from fully implementing DI. Constructive comments on how to improve the research/survey were also suggested. Some of the comments provided include the following:

- "Objectives for a course are not as flexible as techniques for instruction and assessment."
- "We have certain areas that we must cover for accreditation so there is no wiggle room."
- "At times it is difficult to differentiate due to time and candidates completing field experiences during methods and undergraduate courses. I believe choice, depth and complexity, and using a variety of pedagogical approaches support the varying needs of students of which I use in my classroom."
- "I have studied differentiation, and know about it, but I don't model it in my courses. I would like to, but would need support and assistance in doing so."

- “I teach methods classes as well as supervise student teachers. This survey would have been much easier for me (and probably better for your results) if I could have answered the sections based on those different courses. I found myself focusing on how I teach and assess my methods classes, but had to remind myself that I do several things differently for my student teachers.”
- “Great survey! Allowed me to reflect on DI in my college classroom. Thank you. I will probably begin using many of the ideas mentioned that I do not already use in the future.”

Table 10

Major Categories of Open-Response Question

Major Categories: 4	Associated Categories: 17
Type of Course	Online, methods, content
Institutional Input	Time/workload, flexibility/set curriculum, class size
Differentiated Instruction	Content, process, product, learning environment, introduced in class, attempts DI, difficulty with implementation
Survey/Research	Problems with survey, positive, negative, no relation

Since the open-ended response focused on concerns, questions, and comments on differentiating at the higher education level, the obvious and dominant category most frequently referred to in the open-ended question was the implementation of DI. A frequency breakdown of the most commonly used words from the responses illustrate that instructors clearly understand DI and are attempting to employ some of the practices in their courses. Teach/teacher/teaching was the most commonly used word (frequency of 36) with students (frequency of 28), courses (frequency of 24), and class/classroom (frequency of 20). Words that were most used, 10 or more times (17%), are provided (see Table 11). Two comments were:

- "I provide differentiated assignment in nearly all the courses I teach so that students can link content to practical applications in their individual work settings,"
- "I use multimodal approach to teaching in order to effectively reach different learning preferences. I also utilize choice that involves different modalities in order to provide opportunities for students to express their knowledge in a variety of ways."

Discussion

According to Logan (2011), limited teacher experiences with DI correlated with an unclear understanding of what differentiation looked like in action, how to assess students' readiness levels, and how to match appropriate resources with teaching. According to Ernst and Ernst (2005), to explicitly customize learning experiences to fit each student's needs, instructors may need to preassess each student's learning profile, level of readiness, and interest level (Ernst & Ernst, 2005). Very few university instructors in teacher preparation programs in this study preassessed preservice candidates for learning preferences, strengths, or content. Some differentiated content and product (assessment). However, most differentiated process, methodology. What Logan found concerning readiness levels (preassessment) was also found in these results, but that was not the case for teaching methodology.

Fewer than half of the respondents preassessed their students learning preferences, but out of those instructors who did, they asked about preferences such as working in groups, alone, with one other person, and if students preferred to learn by listening, reading, or doing. They did not indicate that they considered if students preferred using technology, media, presentations, or instructor lecture when learning. Instructors also did not consider students preferences for furniture (such as sitting in a comfortable chair) or having background music. Fewer than half of respondents preassessed their students for students' learning strengths, and those who did only asked about interpersonal or intrapersonal strengths. Instructors' results from preassessing students' learning strengths coincided with instructors' results from preassessment of students' learning preferences. There were only two that instructors considered, and those were students' preferences of working in groups or working alone. Overall, instructors did not consider students' strengths such as abilities in language (speaking, reading, writing),

logical/mathematical, visual/spatial, musical, physical, science, perseverance, and/or organizational skills. Some of the challenges mentioned in the qualitative responses included limited contact hours, nature of class (e.g., online, hybrid, content, methodology), and institutional input (e.g., class size, set curriculum, accreditation standards) as obstacles to meaningful differentiate instruction. Unlike P12 classrooms where teachers talk, collaborate, and teach on a daily basis for an entire year, teacher educators on the college level spend short periods of time each week with students and typically do not fully have the chance to get to know students to determine their interests and preferred learning styles. As evident in this study, instructors' teaching approaches toward content and methodology courses differed. For methodology courses, instructors used more of a buffet style pathway to teaching using some DI approaches. For content area courses, instructors seemed more afraid to relinquish control using a more one-size fits all approach to ensure all students gained the knowledge and skills they needed to be successful. One respondent indicated,

> In general, the content of the course is something that would have been difficult to have been learned anywhere else--while preservice teachers have been learners, they have limited exposure to the behind the scenes of teaching, and so rarely have had opportunities to learn what I am teaching prior to class. However, I do work to provide performance assessments, meaningful work, and differentiate through choice about the topics for lesson plans, reflections, etc. I also work to present all materials/content in a variety of ways.

Instructors provided choice on readings, topics, and opportunities for students who showed an interest in learning additional material. There were some who indicated in the open-ended responses that content really could not be changed due to certain standards having to be

met. One respondent indicated, "Objectives for a course are not as flexible as techniques for instruction and assessment," and another noted "We have certain areas that we must cover for accreditation so there is no wiggle room." These two participants indicated reasons why statistical means might have been so low for differentiating content. Their responses are logical, and in line with Griess and Keat (2014) who indicated university policies, requirements for accreditation (assessment), class size, online courses, and teacher candidates' content knowledge readiness can hinder implementation of DI.

When respondents were asked if they differentiated process (methodology), about 95% indicated "yes." Perhaps teacher education programs have advanced a bit more than when Ernst and Ernst (2005) wrote, "College instruction remains dominated by a one-size fits all approach to teaching (i.e., lecture format augmented by discussion groups) …" (p. 40). Instructors indicated they used lecture, some type of electronic information guide (such as *PowerPoints*), supplementary resources (not just a textbook), electronic management system (such as Desire to Learn, Blackboard), and cooperative learning. Overall, many indicated that they used more than one methodology when teaching. One interesting find was that they used worksheets. Responses for using worksheets was one of the highest means.

Instructors did not use a Socratic method, student learning preferences, interactive white boards or student response systems, peer tutoring, or student teacher one-on-one time. It was not a surprise responses indicated instructors did not use student-learning preferences for tweaking methodology since fewer than half of all respondents indicated they even preassessed students for learning preferences. Instructors also did not encourage students to seek help from student support services. Perhaps most students in their courses were doing fine academically, and there was not a need to recommend additional help outside of the class.

More than half of respondents indicated they differentiated product (assessment). Instructors indicated they provided a variety of grading tools including rubrics, grading scales, and grading criteria before students were actually assessed. Instructors used performance-based and pencil-paper type assessments, but not portfolio-based assessments. They would have their students present material using a method of their own choice in front of the class. Instructors indicated that that they did not assess content the same way for all students, but they also indicated students were not provided assessment options. They provided a variety of assessments in a course, but students were not given assessment options.

Even though there were no statistically significant differences for variables such as public and private institution, gender, age of respondents, and years of service, it is interesting that age of respondents showed no statistically significant differences. With so much change incorporating technology into education, one might think that the older generation might not be as open to technology integration for differentiating instruction. This was not the case in this study. Regardless of age, there were no differences in any of the constructs.

Overall, fewer than half of these respondents indicated they preassessed their students. However, almost everyone differentiated teaching methodology. Joseph et al. (2013) indicated that some teacher educators still teach and evaluate all students using the same methods, failing to provide current and prospective teachers the opportunity to experience DI through college instructors modeling it. Participants in this study seem to be willing to provide additional information to students who do show an interest. Most instructors appear to assess the same objectives, but do provide students options for providing evidence of mastery of course content.

These findings are timely since there is very little research about teacher instructors in teacher education programs and differentiated instruction (Gould, 2004; Santangelo &

Tomlinson, 2009; Tomlinson, 1999). Tulbure (2011b) indicated that, "Differentiating instruction in higher education is currently an open issue" (p. 82). Gould (2004) overtly noted that university instructors must demonstrate DI in their teacher preparation courses to allow prospective educators to encounter DI through effective modeling of differentiating. However, Tulbure (2011a, 2011b) indicated that overt empirical support of DI implementation on the university level is just not yet abundant enough. This research did not set out to examine the actual viability of implementing DI on a college level. The intent was simply to examine if instructors in teacher education programs were modeling DI for their students. Overall, many of these participants were modeling DI on some level.

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Appendix

Survey

Differentiated Instruction Survey

The purpose of this research is to examine perceptions of instructors' in teacher preparation programs at institutions of higher learning (IHLs) on differentiated instruction. Completion of the survey is completely voluntary. You may stop at any time during the process. All information obtained will be used strictly for the purposes of this research. Responses are completely anonymous. Helping develop an understanding of perceptions of instructors' in teacher preparation programs at IHLs on differentiated instruction could be quite beneficial in helping better understand instructors' stance on this timely topic. Your input is valued, and your consideration to participate is greatly appreciated!

Routing Question
Do you teach in a teacher education program at an institution of higher learning?

Section A: Demographics
Directions: Please provide responses for the following demographic requests.

How many years have you been teaching in a teacher education program at an institution of higher learning (IHL)?

How would you describe your IHL?
Private Public
Private/Christian Other
If other, please provide description.

Do you teach primarily in an elementary education or secondary education program?

Do you teach in a Special Education Program?

Do you teach in a Gifted Education Program?

What is/are your major area(s) to teach/coordinate/facilitate? Language Arts, English, Social Studies, History, Mathematics, Science, Biology, Chemistry, Student Teaching, Teacher Internship, etc…

What course types do you primarily teach?
Methods Courses
Assessment Courses
Content Courses
Student Teaching/Internship
Other
If other, please provide that information.

How many years did you teach in a K-12 setting?

Please provide your age.

Please provide your gender. Male Female

Please provide your ethnicity.
Caucasian/White African American/Black
Hispanic/Latino Asian
Middle Eastern Pacific Islander
Native American/Alaskan Other
If Other, please provide information:

What is your highest degree completed?

Bachelor's Master's Ed. S. Ph. D. Ed. D.

Routing Question
Do you assess your students at the beginning of a course for student learning preferences?

Directions: Please select an option for the statements provided.

Scale: 1 = Very Rarely or Not really 3 = Often
2 = Sometimes 4 = Quite often or Almost Always

Section B: Preassessment for Student Learning Preferences	1	2	3	4
I ask students if they prefer to learn best				
in groups				
alone				
with one other person (as with a peer)				
with technology				
having paper copy of PowerPoint notes to use as a guide				
using PowerPoints on a projector in front of class to use as a guide				
reading material before coming to class				
presenting material to the class				
with low lighting (such as lamps instead of florescent lighting)				
from instructor lecture				
sitting in a comfortable chair				
listening				
reading				
listening and reading				
doing				
with quiet, soft music playing in the background				
I ask students about their strengths in				
Language - Spoken				
Language - Reading				
Language – Writing				
Logical/Mathematical				
Spatial Ability				
Interpersonal Skills (Leadership ability)				
Intrapersonal Skills				
Musical Ability				
Physical Ability				
Science Ability				
Perseverance Skills				
Organizational Skills				

Routing Question
Do you differentiate content (what you teach) for students in a course when you teach in a particular course?

Directions: Please select an option for the statements provided. The statements are in relation to courses you teach in a teacher education program at your IHL.

Scale: 1 = Very Rarely or Not really 3 = Often
2 = Sometimes 4 = Quite often or Almost Always

Section C: Differentiating Content	**1**	**2**	**3**	**4**	**NA**
I preassess students at the beginning of the course about what they want to learn from the course.					
I preassess at the beginning of the course about their interests.					
I provide course objectives (specific learning outcomes) to the students at the beginning of the course.					
I teach the same content to all students in a course.					
I allow students to decide on their own topic of interest for at least one assignment in the course.					
I provide students a choice for learning different course objectives.					
I preassess students on prior relevant content knowledge (specific learning outcomes).					
I offer mini lessons at varied content levels for students who already have mastered some of the course content.					
I allow students to choose their own readings for at least one assignment.					
I allow students to choose their own topic for a particular assignment.					
I provide tiered content for students.					
I omit covering some material if students exhibit already having knowledge of content.					
I provide opportunities for students to learn additional content if they are moving at a faster pace than other students.					
I provide opportunities for students to learn additional content if they are interested in learning more content.					
I embed students' special interests in content.					

Routing Question
Do you differentiate how you teach (methodology) in a course?

Directions: Please select an option for the statements provided. The statements are in relation to courses you teach in a teacher education program at your IHL.

Scale: 1 = Very Rarely or Not really 3 = Often
2 = Sometimes 4 = Quite often or Almost Always

Section D: Differentiating Process	**1**	**2**	**3**	**4**
I teach using lecture.				
I use the Socratic method.				
I use some type of electronic information guide (e.g., PowerPoints) provided to students to print before class to use as a guide while students are in class.				
I use some type of electronic information guide (e.g., PowerPoints) projected in front of the class to use as a guide while students are in class.				
I use supplementary resources (not just a textbook).				
I use a variety of teaching resources (not just a textbook).				
I use an electronic classroom management system (e.g., Desire to Learn, Blackboard, WebCT, etc…)				
I teach closely following a textbook.				
I regularly change my teaching methodology (other than using lecture only).				
I decide my teaching methodology based on student learning preferences.				
I typically utilize more than one teaching methodology in one class period.				
I utilize up-to-date technology to teach lessons. (E.g., Interactive White Boards, Student Responses Systems, Tablet, Web 2.0, Computer-based instruction)				
I group students to utilize cooperative learning techniques.				
I utilize peer tutoring.				
I utilize worksheets.				
I utilize one-on-one instruction.				
I encourage students to utilize student support services such as tutoring services provided by the IHL.				
I rearrange the furniture in a classroom (arranging tables, seats, for individual seating or for small group etc…) to facilitate learning.				

Routing Question
Do you differentiate how you assess in a course?

Directions: Please select an option for the statements provided. The statements are in relation to courses you teach in a teacher education program at your IHL.

Scale: 1 = Very Rarely or Not really 3 = Often
2 = Sometimes 4 = Quite often or Almost Always

Section E: Differentiating Product (Assessment)	**1**	**2**	**3**	**4**
I assess content the same way for all students in the same course.				
I provide students with sample assessment items before actually assessing them for mastery of specific learning outcomes.				
I provide students with assessment options, but the same objectives are assessed.				
I provide all assessment grading tools (e.g., rubrics, grading scales, grading criteria) to students before students are assessed so they know how their products provided as mastery of their learning outcomes are going to be assessed.				
I utilize technology to assess students. (e.g., Students turn in assignments in Microsoft Word, and I use track changes to grade the assignment and return graded assignment to students. Students take traditional types tests on the computer.)				
I utilize portfolio assessment.				
I utilize performance-based assessments.				
I utilize traditional type pencil-paper type assessments.				
I utilize assessment online (such as quizzes in an online electronic type classroom format such as Desire to Learn (D2L, Blackboard, WebCT, etc…)				
I have students present material using a method of their own choice in front of the class.				

Routing Question
Do you facilitate undergraduate student teachers while completing student teaching and/or alternate route students who are working in the classroom?

Directions: Please select an option for the statements provided. The statements are in relation to students working the classroom in a teacher education program at your IHL.

Scale: 1 = Very Rarely or Not really 3 = Often
2 = Sometimes 4 = Quite often or Almost Always

Section F: Differentiating Assessment for Students Teaching in the Classroom	**1**	**2**	**3**	**4**
I assess content the same way for all my students who are working in a classroom.				
I provide my students with sample assessments before actually assessing their work.				
I provide my students with assessment options, but the same objectives are assessed.				
I provide all assessment grading tools (e.g., rubrics, grading scales, grading criteria) to my students before they are assessed so my students know how their products provided as mastery of their learning outcomes are going to be assessed.				
I utilize technology to assess my students. (e.g., Students turn in assignments in Microsoft Word, and I use track changes to grade the assignment and return graded assignment to students.)				
I utilize portfolio assessment to assess my students.				
I utilize performance-based assessments to assess my students.				
I utilize traditional type pencil-paper type assessments to assess my students.				
I utilize assessment(s) online such as quizzes in an online electronic type classroom format (e.g., Desire to Learn, Blackboard, WebCT, etc…) to assess my students.				

Section F: General Open-Ended Question

Please feel free to provide any additional information, make comments, and/or raise any questions concerning differentiating on the college/university level.