Modeling Universal Design for Learning Techniques to Support Multicultural Education for Pre-Service Secondary Educators

Mary Pearson

Introduction

As with all levels of education, secondary level classrooms, typically from grades fifth or sixth to grade twelve, are increasingly becoming more diverse as the population of students changes in the Unites States (Lopes-Murphy, 2012; McGuire-Schwartz & Arndt, 2007; Strobel, Arthanat, Bauer, Flagg, & Rehabilitation Engineering Research Center on Technology Transfer, 2007). Pre-service mid-level or secondary level educators need increased training on how they can best teach in a multicultural setting to assist all their future students to succeed in learning (Lopes-Murphy, 2012; Spooner, Baker, Harris, Ahlgrim-Delzell, & Browder, 2007).

Universal Design for Learning (UDL) has been found to be a beneficial framework and planning process for educators of all grades to learn and utilize in order to increase educational gains for all students, (Benton-Borghi, 2013; Lopes-Murphy, 2012; McGuire-Schwartz & Arndt, 2007; Spooner et al., 2007; Strobel et al., 2007). Harac (2004) states: "Its researchers claim that with the right materials, technology, and training, teachers can make all lessons flexible enough to benefit every student—including those considered 'disabled'" (p.1).

Studies have shown that, even with limited exposure to training in UDL, especially related to lesson plan creation, secondary and other educators can display an increased ability to incorporate UDL related teaching techniques that can benefit all learners in today's diverse classrooms (Lopes-Murphy, 2012; McGuire-Schwartz & Arndt, 2007; Spooner et al., 2007; Strobel et al., 2007).

According to the Center for Applied Special Technology (CAST), UDL "is a set of principles for curriculum development that give all individuals equal opportunities to learn" (2013a). UDL incorporates multiple means of engagement, action and expression, and representation to assist educators in creating curriculum that is accessible to all learners (CAST, 2013a). Thus it is argued that all teachers need to know how to utilize UDL for their classrooms—especially secondary level teachers (Lopes-Murphy, 2012; Casper & Leuchovius, 2005; Kortering, McClannon, & Braziel, 2005; Jimenez, Graf, & Rose, 2007).

While all teachers should know how to create UDL classrooms and lessons, many future secondary teachers are not well prepared in their teacher education to understand and successfully implement UDL (Lopes-Murphy, 2012; Spooner et al., 2007; Strobel et al., 2007). As Gay stated (2002): "Teachers' knowledge about and attitudes toward cultural diversity are powerful determinants of learning opportunities and outcomes for…different students" (p. 613).

The purpose of this article is to review a process of introducing future secondary educators to UDL in a teacher education course in a southern university in the United States. The article will review how the higher education instructor modeled UDL techniques to future secondary educators in a course they took which focuses on teaching future educators to work with diverse students, including students with disabilities, English Language Learners (ELL), and other diverse learners.

The university students were introduced to UDL via "flipping the classroom techniques" and active learning techniques, and were then assessed by creating UDL lesson plans in their content areas and modeling part of their lesson plans to each other.

Flipping the Classroom

Utilizing technology in all areas of education is important, especially when modeling teaching techniques to future educators that can include all learners (Dinmore, 2013). Utilizing flipped learning techniques can be a good way to incorporate technology into learning and make learning more Universally Designed. As the Flip Learning Network (2014) describes:

> Flipped Learning is a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter. (p. 1)

Typically, flipped learning incorporates video lectures, readings, online modules, online quizzes, and other online activities to engage individual students so they can come to class with background knowledge about the topic intact, and be more involved in active learning techniques during the face to face or online classes (Educause, 2012). Flipped learning teaching methods and techniques correlate well with Universal Design for Learning (UDL) because these methods incorporate technology, individualized and group teaching techniques, and promote flexible learning.

As Dinmore (2013) describes, both pedagogical techniques—flipped learning and UDL—have these characteristics:

> 1. Have the concept of flexibility at their core.
>
> 2. Rely on a technology rich environment with groups of networked learners.
>
> 3. Encourage self-paced learning through the provision of Internet based materials.
>
> 4. Rely on a high level of explicit communication with students facilitated by ICT [Information and communications technology] (p. 233).

To model how flipped learning can

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work for higher education and secondary level students, flipped learning techniques were utilized throughout the university course discussed in this article. Most of the flipped learning sessions involved use of modules that could teach students prior knowledge about the concepts the class would then learn more about face to face, such as Universal Design for Learning (UDL), Cooperative Learning, Response to Intervention (RTI), Culturally Responsive Teaching (CRT), and laws that affect public education in the United States (CAST, 2013c; Kagan,2013; National Center for Learning Disabilities, Inc., 2014; Kea, C., Campbell-Whatley, G., Richards, H., & National Center for Culturally Responsive Educational Systems [NCCREST)], 2006).

The flipped learning also involved video and video models, online readings, use of Live Binders (http://www.livebinders.com/welcome/home) designed to encourage student exploration and learning about the course topics, and graphic organizers. Initially, the flipped learning was utilized mainly as basic homework assignments, which evolved over time to now utilize the class Blackboard Learning program to outline specific flipped learning sessions, and discussions were held in class about how secondary level educators could create more UDL classrooms by utilizing flipped learning methods (Blackboard, 2014). Appendix A provides a list of some of the online modules utilized for the flipped learning components of this university course.

Active Learning Techniques

As defined by Stanford University, active learning "means students engage with the material, participate in the class, and collaborate with each other" (2014). There are many different types of active learning, ranging from cooperative learning techniques to brainstorming, using case studies in class, and having students utilize technology to engage in the classroom concepts (Brigham Young University Center for Teaching & Learning & Halverson, T., 2014; Office of Instructional Consulting, School of Education, Indiana University Bloomington, n.d.; O' Neal, Pinder-Grover & Center for Research on Learning and Teaching, University of Michigan, 2014; Paulson, D. & Faust, J., 1998; Stanford University, 2014).

It is important for future educators to learn about active learning techniques and understand how to successfully include multicultural students when utilizing these techniques (Gay 2002). There are many parts of the Individuals with Disabilities Education Act (IDEA) of 2004 and other education laws that affect educator's daily lives and teaching techniques, including making accommodations and modifications to curriculum and teaching to ensure that a class incorporates UDL so all students can learn successfully in that classroom (CAST, 2013b).

Active learning techniques that used technology were incorporated into the university class to model active learning with the use of technology to the university students, while helping them gain a better understanding how to work with students with a range of abilities in their future classrooms, and what accommodations and modifications may assist with the universality of their teaching. Students learned these skills by creating graphic organizers, online posters, and conducting research individually and within groups which was then presented via online posters to the whole class, so the students could teach and learn from each other in cooperative ways.

For this course, to assist in modeling Universal Design for Learning (UDL) modalities of multiple means of engagement, action and expression, and representation (CAST, 2013a), students were to create a graphic organizer about strategies, accommodations, and modifications appropriate for students with specific kinds of disabilities (see sample in Appendix B). Students were then also to create an online poster utilizing technology such as Glogster (http://edu.glogster.com/?ref=com), Weebly (http://www.weebly.com/), or Newhive (http://newhive.com/) focused on specific disabilities. Further, students also participated with in-class modeling of group work and utilizing cooperative learning and teaching techniques (Kagen, 2012).

Finally, students also engaged in student led instruction, when they were to present their online posters and graphic organizers to their peers in the class. These activities were all conducted earlier in the course, to build collaboration, use of technology, and modeling of active teaching and learning techniques so that students would be more prepared to work with each other to create and present group lesson plans that had been re-designed to be Universally Designed for their potential future classrooms. Appendix C presents a sample of the explanation for the online poster assignment.

Group Universally Designed for Learning (UDL) Lesson Plans

As a final comprehensive assessment of the incorporation of UDL components into this course and to further model UDL for the future teachers taking the course, the university students were required to complete group and individual components of a UDL lesson plan in their content area, related to specifically assigned disability classifications from the IDEA. Students had to display comprehensive understanding of the concepts they learned about during the flipped learning components, while participating in further active learning techniques such as collaboration with their peers, student-led presentations and modeling to the class, and displaying their comprehensive understanding of all they had previously learned in class by taking a lesson plan in their content area and utilizing all they had learned to create a UDL lesson plan that could be appropriate for a multicultural classroom.

The UDL Lesson plan assignment involved both individual and group components as a way to ensure student accountability (Dotson, 2001). Appendix D displays some components of the outline students used to design their UDL lesson plans. Using all the information and modeling the students learned and observed, they were required to do the following:

1. Individually investigate accessibility components legally required for content area text books and curriculum.

2. Individually create and reflect on two forms of hands-on learning that could be incorporated into the student's specific content area, increasing student expertise in multiple means of engagement.

3. Research individually, and as a group, assistive technology that could benefit students with specific classifications of disabilities and could be incorporated into future classrooms.

After investigating and creating the components listed above, the university students were further instructed on expanded theories and concepts in general and special education to assist them in understanding how to expand classroom Universal Design for all learners, or, as the class called it, the full spectrum of potential learners (Benton-Borghi, 2013). These concepts and theories added to what the university students had already learned about UDL, including differentiation based on future student's range of mastery levels (Gregory & Chapman, 2012). In other

words, differentiation means utilizing concrete, representational, and abstract (CRA) teaching processes (The Access Center: American Institutes for Research (AIR), 2004).

The university students had to display their understanding from what they learned from the flipped learning and active learning parts of the course in areas such as CRT methods, RTI concepts, and finally, understanding how to modify curriculum for all learners using modifications such as adaptations to curriculum, parallel curriculum outcomes, and overlapping curriculum approaches (Koga, Hall, & National Center on Accessing the General Curriculum, 2004).

Students were expected in the group parts of the UDL lesson plan to take a pre-written lesson plan from their content area or cross-content areas and construct a new lesson plan based on the core concepts of the old plan. They had to utilize the methods and concepts discussed above by incorporating accommodations, modifying curriculum, involve assistive technology, utilize more hands-on teaching approaches, increase use of technology, incorporate more active learning techniques, and so forth to ensure that their new lesson plans would cover the needs of all learners in a potential future classroom, including a group-designed hypothetical student with a pre-determined disability.

In particular, the students display a comprehensive understanding of the concepts already covered in the course by incorporating increased and appropriate differentiation for their hypothetical classroom, potential multicultural students, and a range of content area teaching and lesson ideas to create the UDL lesson plan.

Data were gathered from the initial four course sections that were involved in the flipped learning, active learning techniques, and comprehensive individual and group UDL lesson plan to observe if the university student's work displayed appropriate plans of differentiation. Out of 67 students throughout one academic year, 65/67 displayed at least three to five appropriate plans of differentiation in the UDL lesson plan. Table 1 displays a variety of CRT, hands on, and UDL ideas students incorporated into their UDL lesson plans.

Some of these results included ideas students introduced in their group UDL lesson plans within different content areas, to increase differentiation, hands-on learning, and the UDL multiple means of action and expression, representation, and engagement (CAST, 2013a). Their ideas are divided by content areas, non-technological ideas and technological ideas.

Students completed the comprehensive assessment of their understanding of UDL and the concepts that support it by choosing part of their group UDL lesson plan and, as a group, deciding a way to present it to the class. Students discussed how their UDL lesson plan had been designed, modeled an actual learning activity from the lesson plan, and could determine as a group how to present their ideas to the class. Thus, students' understanding was assessed in a more Universally Designed manner than would occur in most typical university courses by incorporating multiple means of representation within the assessment of the university student's learning.

Summary

The CAST website discusses how UDL has been increasingly incorporated into more and more learning environments, including postsecondary level education: "Postsecondary, alternative, and workplace environments have become more prominent in CAST's work, indicating a commitment to improve learning for everyone and at all stages of life" (CAST, 2013c). As future secondary teachers will need to be able to successfully teach a wide range of learners in their future classrooms, they must be prepared to teach utilizing UDL.

To help students understand how to reach and teach a full spectrum of learners, the instructor of the course described in this article, introduced many components and concepts by modeling components of UDL (Benton-Borghi, 2013). The modeling was completed by introducing students to flipped learning which increases the use of technology and assists in making instruction more Universally Designed for all learners who could potentially be in a secondary classroom.

The instructor also utilized different types of active learning techniques to further model for these future teachers how to engage students, increase action and expression in class, and the ways learning concepts were represented. Finally, students were comprehensively evaluated by creating a UDL lesson plan with both individual and group components, ensuring that they understood the many concepts and theories covered in the course. Finally, the university students were required to present and model some of their UDL lesson plan ideas to their fellow classmates.

All of these methods were utilized to assist these future educators to expand their understanding and skills so they can be successful multicultural educators who can capably cover the full spectrum of learners they will encounter in future classrooms (Benton-Borghi, 2013).

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TABLE 1
Results of University Student's UDL Lesson Plans

Content Area	Non-Technological Ideas	Technological Ideas
Social Studies	◆ Inflatable globe ◆ Writing own script/acting out ◆ Puppet shows (sock, brown bag, etc.) ◆ "Create a Campaign" slogan project (C. Williams) ◆ Teaching map skills ◆ 3D Models ◆ Raised lines drawings/ maps (e.g. Augmented Paper-Based Tactile Map) ◆ In-class debates (e.g. utilizing current events) ◆ Bartering/trading activity ◆ "Columbian Exchange" activity to discuss spread of disease ◆ Use of primary and secondary documents and items	◆ Films ◆ Virtual field trips (on computer and Apps)
Language Arts (English, Reading, Foreign Language)	◆ Word Wall ◆ Book Marks (different sizes, shapes, out of different materials such as Silly Putty, etc) ◆ Post-it notes ◆ Writing own scipt/acting out ◆ Puppet shows (sock, brown bag, etc.) ◆ Hands on sentence diagraming ◆ Bring items of significance from novels ◆ magnetic words ◆ Writing about paintings/ pictures ◆ "Book Talk T-Shirts" from "Teaching My Friends!" Blog (D. Rogers) ◆ Total Physical Response ◆ Home-made book ◆ Character chart or photo or color code each (e.g. to assist keeping track of characters) ◆ Create skits ◆ Use of highlighters while reading ◆ Literature Circles ◆ "Splash" game (with vocabulary words from text, create own story using words) (R. McDaniel) ◆ Journaling ◆ Create videos ◆ Use all senses to describe/ write about objects ◆ Games using balls/circles of students (adapted Think, Pair, Share, etc.) ◆ "Osmosis Oracle" strategy (student finds one line in work that encapsulates work as a whole, and then connect other ideas, information, etc. to literature) (C. Noyes)	◆ "Digital Textbook: A Digital Anthology" (J. Gadberry) ◆ Films linked to literature ◆ Vine Smartphone App ◆ Read & Write Gold Software ◆ Bookshare ◆ Rosetta Stone ◆ Translation devices

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Table 1 (continued)
Results of University Student's UDL Lesson Plans

Content Area	Non-Technological Ideas	Technological Ideas
FACS	◆ Staples on measuring tape to mark measurement numbers ◆ Light signals ◆ Using toothpaste/ black construction paper activities ◆ Using gingerbread houses to teaching about housing ◆ Using toilet roll to test children's toys for safety ◆ Baby Think It Over doll ◆ Color coding or labeling kitchen, sewing rooms, etc. ◆ Use of pre-cut, drawn, or self-cut pictures such as for "Slices of Me" class pizza collage activity (H. Cooper) or vocabulary understanding (H. Hall) ◆ Set up resource center in classroom	◆ "MasterCook on Cooking: A Textbook of Culinary Fundamentals, Second Edition" CD Rom (S. Labensky & A. Hause) ◆ How-To videos (e.g. for using kitchen, cooking recipes) ◆ Interactive websites (i.e., for budgeting, checkbook registries, such as mint.com) or using Excel
Arts (Art, Music)	◆ Styrofoam plates for drawing and wide variety of sketching methods and tools (chalk, charcoal, etc) ◆ Clay ◆ Assign students corresponding jobs in classroom ◆ Laminated piano keyboard ◆ spoons, rhythm sticks, claves to play rhythms ◆ Sectionals (music) ◆ Emotional project with music and color ◆ Incorporate locomotion or body percussion ◆ Use of Russian Gusli, hand drums, hand bells, Orff instruments, melody harp, keyboard stations ◆ Use of variety of media (art) such as Maquette, craft sticks, Styrofoam, Plasticine, etc. ◆ Use of easy grips for art/writing utensils, stencils straight edges, rulers, right angles, protractors, compasses, etc.	◆ MACGUMUT 6 ◆ Audio tracks ◆ Good Reader App ◆ For Score (e.g. metronome) ◆ Tonal Energy Tuner ◆ "Jump Right In: The Instrumental Series Book: 1 (R. Grunow, E. Gordon, C. Azzara) ◆ Band in a Box ◆ Dancing Dots ◆ "Standard of Excellence Enhanced Comprehensive Book" (B. Pearson) ◆ Garage Band App
Math	◆ "Integer Flash" game with deck of cards (J. Jones) ◆ Teaching probability, ratio, estimating with dice, coins, deck of cards, graphs, lottery, etc. ◆ Use of manipulatives (all varieties, to teach all areas of math ◆ Hands On Algebra ◆ TouchMath ◆ Play Dough Geometry (e.g. when teaching cylinders, cones, angles, prisms, etc.) ◆ Tangible Proof of Pythagorean Theorem (e.g. with Starburst candy, using yarn and classroom) ◆ String Art Geometry (e.g. learning about lines) ◆ Using individual dry erase boards ◆ Math Shoebox project (students design themed shoebox aligned with math concept) (K. Ellis) ◆ Angle bisector lines (activity with Powerpoint, butcher paper, large pencils, erasers, and yarn)	◆ online graph programs ◆ online quizzes and test programs ◆ Mathpad App ◆ Mathpad Plus App ◆ Mathtalk App with speech synthesizer if needed ◆ MathType App ◆ Factor Race App

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TABLE 1 (continued)
Results of University Student's UDL Lesson Plans

Content Area	Non-Technological Ideas	Technological Ideas
Math (continued)	◆ Polynomial Scavenger Hunt ◆ Graphing with candy ◆ Use of GeoBoards, Pattern blocks (color coded) ◆ Create quilt blocks to tessellate shapes ◆ Linking blocks or Base Ten Blocks ◆ Graphing linear equations or ordered pairs with tape, floor (full Body Style) ◆ Use financial planning to teach math (e.g. classified adds, websites, etc.)	
Science	◆ Inquiry based labs ◆ "Trashketball" game ◆ Posterboard projects	◆ Virtual Dissection Apps ◆ polleverywhere.com to use cell phones for polling
All	◆ "Café" Style Teaching (M. Prince) ◆ Bringing real life examples (e.g. clothing from certain time periods, etc.) ◆ "TAG" system (T=Tell something you like; A=Ask a question; G=give a positive suggestion) from teacherspayteachers.com (D. Rogers) ◆ Teaching students how to organize their notebooks and notes ◆ Paper writing guides ◆ Use of manipulatives (e.g. Bingo markers or chips) ◆ Break up expectations/ activities ◆ Cooperative Teaching (e.g. Role sheets) ◆ Group presentations/ projects ◆ Inquiry based labs ◆ Graphic organizers, Venn Diagrams (on-line, iPad, paper, etc.) ◆ Variety of games and puzzles ◆ CLOZE notes, Cornell notes, hand-outs, transcripts of lecture ◆ Cross-content teaching ◆ Using cooking/food/ every day utensils or tools ◆ Create a poster project	◆ Pinterest ◆ Use of Voki online ◆ Khan Academy ◆ Use of Podcasts

Note: Student names are included if idea is quoted only in their lesson plan, and is a formal name of a teaching idea. Students gave permission for their names to be included in this article. References in Table 1 were provided by students in their lesson plans.

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Appendix A

Online Modules Utilized for Flipped Learning

1. Provider: The Iris Center at Peabody College, Vanderbilt University
Module: Teaching English Language Learners: Effective Instructional Practices
http://iris.peabody.vanderbilt.edu/module/ell/

2. Provider: CAST UDL Online Modules
Module: Introduction to UDL
http://udlonline.cast.org/page/module1/l3/

3. Provider: The Iris Center at Peabody College, Vanderbilt University
Module: Cultural and Linguistic Differences: What Teachers Should Know
http://iris.peabody.vanderbilt.edu/module/clde/

4. Provider: The Iris Center at Peabody College, Vanderbilt University
Module: Universal Design for Learning: Creating a Learning Environment that Challenges and Engages All Students
http://iris.peabody.vanderbilt.edu/module/udl/

5. Provider: The Iris Center at Peabody College, Vanderbilt University
Module: RTI (Part 1): An Overview
http://iris.peabody.vanderbilt.edu/module/rti01-overview/

Appendix B

Strategies, Accommodations, and Modifications T-Chart Graphic Organizer

Accommodation	Modification	Strategy

Appendix C

Sample Explanation of Online Poster Assignment

Glogster on Disability Classification Area:

1. Complete a T-Chart for each IDEA Disability Classification Area your group is assigned.

2. With your chapter, the Powerpoints, and up to date (well researched) information from the web, please create a summary about each disability your group was assigned. Make sure the information is pertinent to educators, is non-stigmatizing, uses person-first language, and is accurate.

3. Research and find at least 1 video related to the disability classification areas your groups were assigned AND inclusion, and at least 1 picture example of an accommodation/modification/strategy that can be utilized in secondary classrooms to assist students with that specific area of disability to be more successfully included in general education classrooms.

4. Create your Glogster including your T-Chart, information summary, and visual examples. Add any other pertinent information as you see fit. Make sure that the Glogster's area well designed, have accurate up-to-date information, provide non-stigmatizing information, and uses person first language only.

5. Create a 1 page hand-out (and make enough copies for each person in the class including Dr. Pearson) that can be handed out when you present your Glogsters.

6. You will be presenting your Glogsters to the class on the dates announced in class.

Appendix D

Sample of UDL Lesson Plan Outline University Students Used

Lesson Objective:

IEP required accommodations:

IEP required modifications:

What related service personnel, special education personnel, etc. are involved in the lesson?

What Assistive Technology is involved in the lesson/student?

Break down State/National Standard into the following:

Concrete component of standard:

Representational component of standard:

Abstract component of standard:

Response to Intervention

What Universal Design for Learning "means of" components will be built into your lesson?

How will these "means of" be designed to engage all learners?

How are you utilizing differentiation for all level of learners in your class? What will that look like?

How is differentiation be embedded into the lesson?