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UNIVERSAL DESIGN IN EDUCATION

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Abstract

In this study we surveyed 35 undergraduate and 24 master's level students to gather their views about the use of inclusionary and universal design practices in primary schools. The 35 undergraduate were graduating to become certified teachers and the 24 graduate students were already certified teachers. The participants responded to 27 Likert scaled questions and 3 open ended questions in a survey related to inclusion and universal design. All participants in both the undergraduate and graduate group displayed an understanding of inclusion, while 4 of the 35 undergraduate students and 20 of the 24 graduate students displayed an understanding of universal design principles. When asked about the major differences between theory and practice all but one student indicated that although they agreed with the spirit behind inclusion and universal design, in practice there were major issues with implementing the concepts. Undergraduate students indicated that "inclusion was more difficult to apply in practice", while graduate students described more specific issues to implement both inclusionary ideas and universal design practices. All but one of the 59 students indicated that they agree or strongly agree with the concepts of inclusion and universal design. The in-service teachers (graduate students) indicated that they want to be able to reach more of their students by being supported in their efforts to develop their skills in implementing inclusionary and universal design practices.

Keywords: Universal design; inclusion; equal access; student centerness; special needs.

1. Introduction

Universal Design for Learning (UDL) is defined by a set of principles for curriculum development, presentation, interaction with students, and assessments that offer students equal opportunities to learn (National Center on Universal Design for Learning, 2014). In the UDL process the goal is to not only have students gain the knowledge and skills of the curriculum but to also to help students master the art of learning. In order to do this the National Center on Universal Design for Learning (NCUDL) advocates

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for students to development and be able to demonstrate three characteristics of effective learners. Effective learners are: 1. strategic, skillful, and goal directed, 2. knowledgeable, and 3. purposeful and motivated to learn. We know from neuroscience research that the human brain is unique in each individual (Sousa, 2011), indicating that in order to reach every child we have to create teaching and learning opportunities that assist every student in accessing and learning the curriculum (Sousa, 2016). The traditional one size fits all curriculum cannot accomplish that task (Caine & Caine, 2011). Each individual should be supported in accessing, interacting with, and be assessed on her/his competence in variety ways that will create a clear picture of each student's abilities and accomplishments (NCUDL, 2014). UDL extends the idea of universal access to the curriculum to universal access to learning (Rose & Meyer, 2002). In other words it is not good enough to access the classroom and the curriculum, the actual goal of schooling is to assist all students in their learning. Rose and Meyer write: "These days, we are demanding more of students than the acquisition of facts: We want them to ask questions, find information, and use that information effectively. We want them to learn how to learn" (Ch. 4, para. 1).

UDL has its roots based in architecture, when Ron Mace began to design and build structures that were available to the widest range of people possible (Rose & Meyer, 2002). We began to see buildings that were strategically to be accessible to people who had all kinds of disabilities. Today we almost take for granted features like elevators, escalators, handicap accessible bathrooms, wide corridors, automatic opening doors and door openers, brail signs, lower sinks, bigger print signs, talking signs, wheel chair ramps, family bathrooms, handicap parking spaces, and more (Florescu, 2015). What we have found from this work is that these features not only assist people with handicaps but they also assist other people to make their lives easier (aged people, young children, people carrying packages, parents with babies, people who do not speak the native language, etc.). When we expanded universal design to learning we have found these same advantages to be present: what we do to assist students with handicaps if often also helpful to many other students (NCUDL, 2014). The reality is that most people benefit from universal design in buildings and in learning.

2. Literature Review

2.1. Equity

This process, though, must go far beyond the issues of students with handicaps (Portes, 2008). Our schools have become and continue to be more diverse than at any other time in history. According to Portes we have failed to effectively educate millions of students who live in these culturally diverse environments in their homes, and children who live in poverty continue to suffer from inadequate education. In spite of our nation's effort to desegregate schools we continue to see segregated schools throughout our nation. Darling-Hammond (2010) writes, "But half a century later, and with integration a given, many of our students still have separate and drastically unequal learning experiences" (in Tomlinson & Javius, 2012, p.1). Portes (2008) describes how our education system helps to sustain this institutional bias. He writes:

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Most of these children are inadvertently being prepared for limited socio-economic opportunities and failure upon entering school. Schools not only fail to educate some children equitably but also perpetuate poor economic futures for them and the nation. As a result, children are bound in a context of economic deprivation that is progressively limiting with respect to intellectual development, achievement motivation and the possibility of benefiting from schooling. (p. 2)

In order for students to learn everything they need to learn to be successful in school and in life after graduation every student needs equal access to the curriculum and to effective learning. We know that poverty affects the development of children in very negative ways (Sousa, 2011). But to date we have done little to remedy the effects of poverty or to alleviate poverty itself (Portes, 2008). From an equity perspective we have to change how we perceive and work with diverse populations, especially those who have been living and dealing institutional and social bias throughout their lives. Portes (2008) explains: "A major premise from the social justice vantage point is that organizing a more equitable, socially just history will significantly reduce, in time, not only conflict and war, but gross group- based disparities in educational and economic outcomes." (p. 3)

The philosophy and strategies of UDL are integral to our ability to help students move from the grips of social and educational bias to equal access to effective learning. UDL is based on the democratic value that every student deserves to receive a great education no matter their circumstances.

How will we know if we are approaching equity in our schools? We believe that we will be approaching equity when we see the following occurring in our schools and school districts:

1. Education is really open to every child.

2. Education is differentiated in design and implementation for the individual educational needs of every child.

3. Education is adapted to the needs of different groups.

4. Education adapts to both the individual needs of children and the changing needs of society.

If we work for equity we will develop schools in which individual students will have real options to consider about their lives, and schools will help make those decisions based on their students' skills, abilities, and talents and not based some bias or stereotype. This kind of education will help students of every race, color, religion, gender, ethnic background, and socioeconomic status develop the knowledge and skills necessary for them to achieve academic success and become productive citizens.

2.2. Universal Design for Learning

In order to ensure that all students are educated effectively UDL is based on three organizing principles: 1. Provide multiple pathways for students to interact with and engage with each other and the curriculum and to express what they have learned, 2. Represent curricular information in multiple formats and media, and 3. Provide multiple ways to engage students' interests and motivations (Rose & Meyer, 2002; NCUDL, 2014). Rose and Meyer (2002) state, "The central practical premise of UDL is that a curriculum should include alternatives to make it accessible and appropriate for individuals with different backgrounds, learning styles, abilities, and disabilities in widely varied learning contexts" (para. 2). Rose and Meyer tells us that learning requires challenge and resistance. In their view that creates the difference

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between access to information and deep learning. Caine and Caine (2011) agree and believe that all students have to be challenged appropriately in order to be placed in a state they call relax alertness. In this state students are challenged to learn at a level that challenges them and in an environment in which they receive the assistance they need to meet the challenge. Dweck (2006) reports that students who stick with learning and believe in their abilities to learn practice and rehearse strategically. These students and their teachers seek to find out what they do not yet know or can do and move to learn the concepts and skills they need to be successful.

2.3. Multiple Pathways of Engagement

The National Center on Universal Design for Learning (2014) provides descriptions of each of the UDL principles. The principle of engaging students in multiple ways has two goals for students – to be purposeful and motivated learners. There are three areas for teachers to provide students these various pathways to work with curriculum. First, students should be provided with options for regulating themselves. This is done first by providing students expectations and beliefs that optimize motivation. Second, teachers can facilitate their students with the acquisition of coping skills and strategies to persevere in their work. Third, we can assist our students by teaching them how to become reflective learner (metacognitive skills).

Next, students are provided options to help them sustain their efforts. This can be accomplished first by giving students or helping to develop goals that make sense and are meaningful (Sousa, 2016) to them. Second, teachers can vary demands and resources for our students in order to optimize the challenges for them. The third thing teachers can do is to develop a classroom environment that is supportive, collaborative, and positive (Fitzgerald & Laurian-Fitzgerald, 2013; Laurian-Fitzgerald & Fitzgerald, 2016). Finally, teachers can provide effective formative feedback for students. This kind of feedback is positive, specific, and helpful for student growth (Hattie, 2009; 2012).

In order to provide students reasons to be interested in their learning teachers can first offer choice and autonomy to students. Caine and Caine (2011) believe that we should work toward what they call tier III teaching and learning in which the students drive the learning and the teacher assists them in this process. Second teachers can provide students with connections to their lives and the real world in order to give relevance and authenticity to their work. Third, teachers should make sure the learning environment is free from threats and distractions. We know that the brain does not multi task well, despite what some teenagers believe (Sousa, 2016). And we also know that students do not learn well when they are fearful (Sousa, 2011; 2016).

If we expect students to learn then we have to make sure we engage them in their work in meaningful and active ways. If students expect to learn then they have to fully engage in the learning process. We can set up the environment to make it more likely that students will engage. Students have to also play their part well if they expect to learn effectively. If both parties do their part then amazing results will and do occur.

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2.4. Multiple Means of Representation

The goal of using multiple means of representing curriculum is to assist our students to become resourceful and knowledgeable learners. There are three ways to provide options for our students: 1. Options for comprehension, 2. Options for language, mathematical expressions, and symbols. To assist students in their comprehension teachers can first help them to connect their previous learning to their new learning (Sousa, 2011). We also can help students to see connections, big ideas, patterns, and relationships in their new learning and also between their old and new learning (Sousa, 2011). We can also help our students by providing them with different ways to visualize, process, and manipulate the information with which they work. And we should also help students to solidify what they are learning through closure activities in order to move their learning to long-term memory so they can transfer their learning in new circumstances.

In order to assist our students in their skills with language, mathematical expressions, and symbols we have five ways to provide them with options. First, we should clarify in multiple ways language, mathematical expressions, and symbols so students understand them in order to use them effectively. We should also help students to be familiar with the syntax for writing and literature in multiple ways. Third, we should ensure that students understand important symbols, mathematical notations, and the text in various ways. Sousa (2016) explains that students need to practice and rehearse often and strategically in order to gain deep understandings. Fourth, we should integrate the curriculum as often as possible to understand the language of different disciplines. Finally, students should be provided with illustrations among different media to assist their understandings.

2.5. Multiple Means of Action and Expression

Teachers can also provide options for students for how they demonstrate what they have learned and what they can do with that knowledge. We can provide alternative ways for students to: 1. Engage their executive functions, 2. Express and communicate their understandings, and 3. Produce their products for their work. We help students to engage their executive functions in different ways by helping students to set goals, by assisting them in being creative, developing plans and strategies for their learning, and by helping them to monitor their own progress (Racasan, 2016). We assist students in developing their voices by giving them various choices in the media they use to express their ideas, by allowing students to use a variety of tools to construct their products and compositions, and by helping them to use a variety of ways to build their competencies thorough various kinds of practice, rehearsal, and performances. Finally, we help students to learn through the use of a variety of response methodologies and products, and by ensuring access to a variety of tools and, when needed, assistive technology.

2.6. Summary

If the goal of education is to take each student and help her/him to reach her/his potential then it makes a great deal of sense to seriously consider the use of UDL in all of our classrooms. In order to actually implement these ideas we must have a philosophy that aligns with UDL practices. Tomlinson and

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Javius (2012) have worked with what is called Teaching Up Strategies. We believe this would be a good place for us to begin to develop our individual philosophies of education. The seven principles of Teaching Up are as follows: 1. Human differences are normal and desirable. 2. Develop a Growth Mindset (Dweck, 2006) in students where they understand that learning is about strategic and ongoing effort. 3. Work to understand our students: interests, intelligences, talents, desires, dreams, and learning profiles. 4. Create a base of rigorous learning opportunities where students are being appropriately challenged and supported, are encouraged to be collaborative and independent thinking, and the work is significant in their world. 5. Remember all students come to the curriculum at different places and they each need different ways to move forward. In the process every student needs to shine periodically. 6. Create flexible classroom routines, procedures, and groupings in order to attend to the needs of every student. 7. Be a reflective practitioner and help students be reflective learners. We need to learn from our students as much as our students need to learn from us.

3. Methodology

3.1. Problem

As we have been working in schools both in America and in Romania we have found that many teachers appear to not understand the concepts related to universal design to learning (UDL) and/or how to implement the principals of UDL. At the University of Oradea we have developed our undergraduate program for our Pre School and Primary School students to attempt to assist our students in understanding how to work with all students in their classrooms in order to approach the implementation of inclusionary classrooms. We also have developed an MED program in special education to assist in-service teachers in their journey to include and assist all of their students. In our discussions with our students and in our observations in observations in schools we are being told that the ideas behind UDL are worthy but that in many schools inclusion is not fully embedded in the physical set up of the schools or in the practices of teachers who feel the pressure of testing.

3.2. Theoretical Framework

UDL is a philosophy of learning and an approach to curriculum design and pedagogical practices that attempts to bring equal access to the learning of all students (National Center on Universal Design for Learning, 2014). The philosophy and pedagogical practices are based on three guiding principles of teaching and learning. Teachers should provide students: 1. multiple ways of being presented the curriculum based of the unique ways different students process information, 2. multiple ways for student to engage with the curriculum, based on their learning profiles, and 3. Multiple was to express, communicate, and demonstrate their knowledge and skills (Rose & Meyer, 2002). Learning, in this system, should be about effort and strategic rehearsal and practice (Dweck, 2006). The center of the learning universe should be the students, not tests, not just the curriculum, and not the teachers (Sousa, 2016; Zhao, 2012). Students should be given the responsibility and authority to become the best students they can be with the assistance of their teachers (Caine & Caine, 2011). In democratic societies all

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students deserve to receive a great education (Darling-Hammond, 2010). All children deserve equal access to learning so they can all reach their potentials.

3.3. Purpose

The purpose of this study is to find out what our pre-service and in-service teachers understand, think, and do in their classrooms in relation to universal design. The results from this study will help us to make recommendations to our undergraduate and graduate education programs at the University of Oradea for the future of our students. We also want to expand the discussion of UDL so that we can have honest and open discussions about the progress we are or are not making for our students who are depending on the educational system to reach their potentials.

4. Participants and Setting

In this study we were interested to see if there was a difference in the attitudes and practices of final year pre-service teachers and in-service teachers. There were 24 undergraduate pre-service students and 35 teachers who participated in the study. All of the undergraduate students were in their final year of their teacher certification program for the Pre School and Primary Education program at the University of Oradea (Romania) so they had completed most of their coursework and practicum experiences and were in the final stages of graduating. All of the in-service teachers were enrolled in the first year of their MED program in special education also at the University of Oradea. The teachers were more varied in their experiences in the field with approximately half of the students with between one and five years of experience and the other half with over five years of experience. All of the pre-service and in-service teachers were pre-school or primary level teachers.

5. Research Design

The research question for our study was as follows: To what extent do pre-service and in-service teachers feel prepared to implement the concepts of universal design into their teaching practices? Our sub questions for this study included: Are there significant differences between the people just entering the field of education and those already in the field? Do pre-service and in-service teachers understand the concepts of universal design? Do pre-service and in-service teachers utilize the concepts of universal design in their classrooms? Are there areas in which pre-service and/or in-service teachers need more assistance? The study is a mixed methods (Creswell, 2013) descriptive study in which we collected quantitative data in the form of a 27 Likert scale survey related to the concepts of universal design. Participants rated their agreement or disagreement on a 4 point scale of 4 (totally Agree) to 1 (Totally Disagree). Qualitative data was collected in the form of three open-ended questions from the same survey. The survey was developed to review data in four areas related to UDL: 1. The physical setting, 2. Attitudes about UDL, 3. Teaching practices related to UDL, and 4. Teacher abilities to implement UDL practices. There were three open ended questions included in the survey: 1. How do you define the

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universal design? 2. What are the most important ways to implement universal design in your lessons? 3. What are differences between theory and practice regarding universal design in classroom and school?

6. Results

In general both the undergraduate students and the teachers had high scores for the survey. The teachers mean score was 3.38/4.0 and the undergraduates' mean score was 3.26/4.0. The teachers scored higher than 3 in all four areas of the survey with scores of: 3.77 for physical setting, 3.51 in their attitudes about UDL, 3.46 in their use of UDL techniques, and 3.04 in their ability to effectively implement UDL practices. The undergraduate students also scored above 3 in three of the four categories, with scores of 3.54 in physical setting, 3.5 in their attitude about UDL, 3.39 in their use of UDL strategies, and 2.91 in their ability to effectively implement UDL strategies. When tested for significance the overall $p = 0.16$ and the $r = 0.19$, indicating that the overall difference was not considered to be significance and the effect size was considered to be small (Cohen, 1988; Rosenthal, 1996). In the area of physical setting the $p = 0.008$ and the $r = 0.35$. Thus, the difference was considered to be very significant and the effect size was considered to be medium (Cohen, 1988; Rosenthal, 1996).

In addition to the individual and total significant differences in physical setting, there were also seven individual statements that resulted in significant differences between the teachers and the undergraduate students. In the area of attitudes about UDL there two statements that showed that teachers had significant positive differences: I attend professional development classes on universal design; I feel comfortable running classes with students from various backgrounds. Their scores were respectively $p = 0.0001$ (very significant), $r = 0.63$ (large effect) and $p = 0.0146$ (significant), $r = 0.32$ (medium effect). In the area of using UDL practices teachers also displayed positive significant differences in three statements: I apply an inclusive pedagogy; I adapt the teaching principles, methods and techniques for each of my student; I adapt the curriculum to a large variety of students with or without special needs. Their respective scores were as follows: $p = 0.0001$ (very significant), $r = 0.37$ (medium effect); $p = 0.0197$ 9significant), $r = 0.31$ (medium effect); $p = 0.0020$ (very significant), $r = 0.40$ (medium effect). In the area of ability to implement UDL practices there were two statements in which teachers scored significantly higher than the undergraduate students: I focus on human beings as unique and authentic individuals; I use with ease the basic elements of universal design no matter how much my students can focus. The respective significance and effect size scores were as follows: $p = 0.0107$ (significant), $r = 0.33$ (medium effect); $p= 0.0001$ (very significant), $r = 0.58$ (large effect).

The in-service teachers in this study scored higher than their undergraduate pre-service counterparts in 22 of the 27 statements in the UDL survey. They scored significantly higher in 9 of the 27 statements on the survey. Experience appears to matter in the teaching and learning process. The undergraduate students scored higher for four statements in the area of using UDL practices (overall application of UDL, encourage self-assessment and reflection, encourage choice and autonomy, and offer correct and objective feedback). Students also scored higher with the statement related to their overall knowledge of UDL. These areas are interesting because they may indicate the content of training for the

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current undergraduate students compared to the training received by current teachers in the field when they were undergraduate students.

In response to the first open ended question 15 teachers spoke about adapting the classroom and teaching for students with special education needs and any other student needs. One teacher wrote, “Equal chances in education no matter the need or deficiency.” Another teacher wrote, “Universal design means adapting the school environment to the needs and requirements of every student in order to facilitate their learning process.” Five teachers wrote about access and acceptance for all students. One teacher put it this way, “A school for all with all.” Three teachers defined UDL as being about meeting the needs of students with special education needs. One teacher defined UDL as meaning that the school should be student centered. She wrote, “The school should adapt for the child, not the child for the school.”

Seventeen of the undergraduate students defined UDL as inclusion of students with special needs in regular classrooms. One student wrote, “Inclusion represents all of the strategies and methods in which the children with special needs are integrated in regular school.” Nine defined UDL as having the school adapt for the needs of all children. “Inclusion means adapting the school to the special needs of all students and not adapting the students to the regular school environment.” Six students stated that UDL means adapting the curriculum to meet the students where they are and then moving them forward. On student wrote, “We only talked about inclusion in class, not about universal design.” Clearly, the undergraduate students looked at UDL from the perspective of inclusion.

The second question asked: What are the most important ways to implement universal design in your lessons? Eighteen of the teachers wrote about adapting the curriculum for all students. Nine teachers discussed adapting the physical plant for equal access to the school building. Teachers wrote about how old many of the schools are and the fact that there are no elevators or ramps inside of the schools. Teachers also discussed lack of other facilities like handicap bathrooms. But they said that they did the best they can given the circumstances. One teacher wrote, “I do the best I can to be creative to make physical adaptations for my students. The other students are very helpful.” The undergraduate students agreed with 14 students stating that adapting curriculum is very important. Five students believed that including all students in the regular classroom is an important idea. A student put it this way, “I believe that we should include all students in our classes, and I work hard to try to do it.” Five students added that they work hard to adapt the curriculum for their students with special education needs. One student stated, “I try to come up with different ideas for my students who have special needs. I have to be creative and know my students individual needs.”

Both groups had more general ideas about how to implement UDL then they did specific techniques. For example, no participant mentioned using the three principles of UDL to make the adaptations about which they wrote. Nobody talked about multiple intelligences or learning styles or using a variety of ways to present material, or, have students interact with the curriculum, or to assess their students. It appears that both groups understand the philosophy of UDL but either do not know or understand the principle for implementing UDL. The responses for the third question bear out this conclusion.

The third question asked participants: What are the differences between theory and practice regarding universal design in classroom and school? Every teacher and two thirds of the undergraduate

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students stated in some way that the theory is great but putting it into practice is very difficult. One teacher wrote, “It sounds like a good idea to adapt for every student, but I have to teach what I am assigned to teach. I cannot teach less.” A student wrote, “I have heard a lot about differentiating my teaching but I have not seen anybody yet to train us how to accomplish that goal. Five of the undergraduate students said they have a difficult time helping students with special education needs. Six teachers wrote that their schools do not have any money to implement many of the ideas, especially expensive items like elevators and building large ramps or renovating and enlarging bathrooms. They also wrote that they have not received appropriate professional development related to UDL. As one teacher wrote, “We do not have money for basic needs, so we cannot afford to bring in specialists or go to trainings.” One student wrote, “I know that we should adapt the curriculum for students but I need more training to be able to do it.”

It is clear from the qualitative data that the in-service teachers and the pre-service teachers all have a basic understanding of UDL (even though the undergraduates apparently have not studied it directly). Both groups also have positive attitudes about the concept of equalizing the curriculum for every student. Pre-service and in-service teachers agree that implementing UDL is much more difficult to accomplish in reality than it is to understand as a theory. Finally, it is clear that the participants in this study would like to have more specific and practical training in relation to implementing the ideas in their real classrooms.

7. Conclusions

The participants in this study all indicated in different ways that they would love to see all of their students be successful in their classes. Most also indicated that theory is easier said than done, and they would like to have the additional training and help necessary to successfully implement UDL in their classrooms. It is clear from the responses from the participants that they have a basic understanding of the philosophy and ideas related to UDL. Both the undergraduate students and teachers would benefit greatly from more specific training in implementing UDL strategies in their classes. Finally, it is clear from the results of this study that experience in the classroom makes a significant difference for teachers.

We have developed four recommendations for universities that have programs for teachers, including our programs. First we believe that undergraduate students should study both inclusionary and UDL strategies in their programs. Second, we recommend that MED programs should include not only theoretical teaching of UDL but also include practical ideas to implement the theory into practice. Third, we recommend that universities include practicum experiences for UDL (and inclusion) as part of their programs. Fourth, we recommend that universities and other important agencies develop professional development activities for the practical implementation of UDL. Finally, we recommend that agencies responsible for funding schools develop a systematic approach to help schools become accessible to all students both physically and academically. We are encouraged by the professionalism and dedication of the participants of this study, and we believe that with appropriate assistance and training teachers will be able to provide all students the education they deserve.

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