# INCREASING THE TEACHING EFFICACY OF A BEGINNING SPECIAL EDUCATION TEACHER USING DIFFERENTIATED INSTRUCTION: A CASE STUDY

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*This article provides a description of how a beginning special education teacher in an inclusion classroom used pre-assessment, self-assessment, and on-going assessment to implement the principles of differentiated instruction to become more responsive to her students' needs in a systematic way. This article describes a case study of one beginning teacher's use of differentiated instruction. First, a discussion of the usefulness of differentiated instruction in increasing the likelihood of success for children with disabilities is provided. Next, qualitative data supported the implementation of the differentiated instruction process to help the teacher realize how she could positively impact students' learning using Tomlinson's (2000) categories of content, product, process, and learning environments. Finally, recommendations are provided for how to engage teachers to implement differentiated instruction as a data-based iterative process of using evidence-based practices to meet the needs of all children in an inclusion classroom.*

The international commitment to ensure the right of all students to have equal educational access (UNCRPD, 2006; UNESCO, 2004) is *becoming part of an emerging international agenda* (Wertheim & Leyser, 2002, p. 54). As of August, 2010, there were 146 signatories and 90 ratifications for the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD). Article 24 of the convention obliges States Parties to *recognize the right of persons with disabilities to education. With a view to realizing this right without discrimination and on the basis of equal opportunity, States Parties shall ensure an inclusive education system at all levels, and life-long learning…* (UNCRPD, Article 24). In 2004, a flagship UNESCO team published *The Right to Education for Persons with Disabilities: Towards Inclusion* (2004) and more recently, Inclusion International (2009) published *Better Education for All: A Global Report* that supports inclusionary practices. What is clear is that there is a concerted international movement in policy toward inclusive education, though there is often general intra-country debate that deaf, blind, and deaf/blind groups be educated separately.

Complementing the policy shift has been research through the 1980s and 1990s that provided empirical data to support the inclusion of children with mild disabilities in the general education setting. More recently, Kurth and Mastergeorge (2010) provided data to support the inclusion of adolescent children with more significant disabilities within general education classrooms. Though small in scope, their research identified math and language arts gains superior to matched children in more segregated settings. Although more research is warranted to support the inclusion movement, it can be argued that there is a clear international intention to educate all children in the general education framework. More evidence on strategies for how to educate children with disabilities in a way that improves academic and social/behavioral skills is warranted.

Preparing teachers to effectively teach an increased number of students with challenging and diverse educational needs requires that teacher preparation programs refine coursework and field experiences. In the United States, *The No Child Left Behind (NCLB) Act (2001) brought additional attention to this*

*topic by mandating that all teachers must be highly qualified and by emphasizing the use of evidence-based practices to improve outcomes for students with disabilities* (Heckaman, Thompson, Hull, & Ernest, 2009, p. 5). Even though many teachers see research as unrelated to their day-to-day and minute-by-minute interactions (Rust, 2009), they can still be taught to use evidence-based practices effectively. Klingner, Arguelles, Hughes, and Vaughn (2001) showed that teachers who were trained to use evidence-based instructional practices were more likely to continue using these practices if they observed the frequent and positive impact on their students' learning and behavior.

To aid the sustainability of using recommended practice, Lytle and Cochran-Smith (1992) noted that to be able to close the research to practice gap, teachers should choose their own evidence based strategies and implement them in a systematic way. For example, Heckaman et al. (2009) highlighted the importance of *requiring teacher candidates to select evidence-based strategies … (and) to instill a sense of ownership and authenticity in the teaching-learning cycle* (p. 7). Furthermore, the authors noted that teachers need multiple opportunities to increase the likelihood that teachers will generalize and maintain these practices over time. Research has shown that teachers who believed that they had the skills and ability to influence student learning and behavior regardless of external factors were more likely to individualize and adapt instruction (Wertheim & Leyser, 2002; Minke, Bear, Deemer, & Griffen, 1996). Recent empirical evidence has identified differentiated instruction as a way to include the use of evidence-based strategies for supporting all learners.

*Empirical Support for Differentiated Instruction*

Differentiated Instruction has been in use as early as the one room schoolhouse when students of all ages learned together (Tomlinson, 1999) and is *rooted in years of educational theory and practice* (Hall, 2002, p. 5). Although different researchers have identified different ways to differentiate instruction (e.g., Benjamin, 2006; Subban, 2006; Tomlinson, 2000; Waldron & McLeskey, 2001; Willis & Mann, 2000), few would disagree with Hall's synthesis from a review of the literature in describing differentiated instruction as a *Basket of Strategies*.

By definition, differentiated instruction makes use of a variety of strategies to respond to the individual needs of students (Tomlinson, 2000). Whether their classroom is designated general education, general curriculum, or inclusive, students will vary in their interests, academic and social skills, concept development, and learning preferences. Research on the effectiveness of differentiated instruction is difficult, however, as the selection and application of strategies are directed by individual circumstances and needs, rather than by the uniform application of one strategy based on a skill or concept deficit.

Much has been written about how to do differentiated instruction (e.g., Clark, 2010; Patterson, Connolly, & Ritter, 2009; Walker-Dalhouse & Risko, 2009), how differentiated instruction effects various affective behaviors (e.g., Clark, 2010; Flaherty & Hackler, 2010) and people's perceptions of differentiated instruction (e.g., Danzi, Reul, & Smith, 2008; Goodnough, 2010). However, given differentiated instruction's long-standing appeal, there has been limited research about the effectiveness of differentiated instruction (Hall, 2002). As the *Access Center Research Continuum* (2006) noted, the evidence available for differentiated instruction was classified as an emerging or promising practice and gave it a *Yellow Light*. In response to the call for more evidence, support for the effectiveness of differentiated instruction has come from theses and dissertations (e.g., Bantis, 2008; Baumgartner, Lipowski, & Rush, 2003; Brimijoin, Marquissee, & Tomlinson, 2003; Ivory, 2007) and a few empirical articles equating specific models with differentiated instruction (e.g., Tiered Instruction in Debaryshe, Gorecki, & Mishima-Young, 2009; Task Based writing Instruction in Bantis, 2008). Consistent within the research is an understanding that careful selection and application of appropriate strategies, based on ongoing data collection and evaluation, is likely to enhance the learning of all students (Baumgartner, Lipowski, & Rush, 2003; Brimijoin, Marquissee, & Tomlinson, 2003; Tomlinson, 2000). Individual teachers, in order to evaluate their efficacy, can and must collect and evaluate data to determine the effectiveness of differentiated instruction for each of their students.

*Models of Differentiated Instruction*

According to Tomlinson (2000), differentiated instruction is when teachers are providing ongoing assessment of instruction/learning, learning activities that are interesting and relevant for each student, and individual/group work that allows each student to experience many different roles and settings. Teachers select strategies from the four areas of content, process, product, and learning environments.

First, content refers to the overall learning outcome, which can be presented at varied levels by individual, enhanced by use of multi-media, or taught in tiered lessons to small groups of students. Second, process refers to differentiating how the content is taught. Examples include differentiated/individualized tasks/agendas; use of different modalities, time schedules, or resources; or different groups/roles for the students. Third, a teacher may change the product. Students can choose to work as individuals or in groups to demonstrate their content knowledge through producing different product. Finally, altering the learning environments can refer to ways in which changing the physical environment and/or the learning environment support all individuals' learning. Examples may be group and individual work space, providing choice with available technology, or flexibility of movement.

The strength, appeal, and utility of differentiated instruction have created a challenge to researchers. When one considers the fidelity of intervention, a natural consequence is to impose structure on which differentiated instruction strategies a teacher should use. This can negate the attractiveness of differentiated instruction to the teacher in practice. Therefore, the purpose of this case study was to evaluate a package of differentiated instruction strategies that practicing teachers systematically chose, implemented, and evaluated (see Lytle & Cochran-Smith, 1992). Using a standardized system of data collection, goal setting and ongoing assessment, data-based planning, and immediate success contributes to the fidelity of the method.

Through reflection on the case study description and analysis, educators around the globe can use the processes described and analyzed in this article to implement differentiated instruction as an evidence-based practice. Given the international movement toward inclusion, special educators and general educators can use differentiated instruction as a method that is being touted as recommended practice within both disciplines.

**Case Study**

*Context*

An author of this article was a beginning/provisional special education teacher completing an online initial certification M.A.T. degree program leading to full professional certification in special education. She had been hired by a school district to work fulltime in the classroom as a teacher of record, and worked on her special education certification using asynchronous web-based technology. As our teacher education candidates (TEC) are working full-time in the classroom, the university assignments are structured to be flexible to fit the needs of the candidates based on the needs of their children.

In the first semester of classes, the TEC took a course designed to identify and implement management and instructional strategies that have demonstrated effectiveness. Through appliedprojects focused on PreK - 12 students learning, students used differentiated instruction and lesson planning as a mechanism to demonstrate the ability to evaluate intervention efficacy. During this first semester, the TEC also took a course focused on assessment. The data for the case study was collected based on the TEC's assessments, planning, and instruction within their 1st grade math inclusion class where children are typically six and or seven yrs. old. This occurred in a Southern state within the United States. The TEC was responsible for three children with identified special educational needs with an Individual Education Program (IEP). The student's characteristics are described in the pre-assessment section of the results.

*Theoretical Framework*

One of the central principles of the initial certification program is a focus on teacher-as-researcher where candidates engage in practices in research throughout their program. The practices in research are typically short term iterative experiences with a focus on using data to make day-to-day instructional decisions. Teacher candidates are expected to use evidence-based practices, collect data to monitor their students' performance, and use that data to guide their instruction.

For this case study, the TEC was encouraged to use strategies from any-and-all of the four differentiated instruction areas to enhance the learning of students. Although this can be perceived as a threat to the concept of fidelity of treatment, the candidate's choice to change strategies based on the revolving needs of her children appeals to the functionality and relevance of teachers' everyday experiences. An overarching structure was imposed as the candidate was to address three interrelated areas: a) data collection, b) data-based planning, and c) use of differentiated instruction as a systematic approach to individualization.

First, for data collection, Brimijoin, Marquissee, and Tomlinson (2003) recommended a pre-assessment, self-assessment, and ongoing assessment model to differentiate instruction. After the teacher education candidate wrote about their students' strengths and challenges, they engaged in their own self-reflection regarding their current practices in the classroom. Second, the information was then used to plan how they were going to use differentiated instruction practices and integrate on-going assessments into the data-based planning process. Third, she implemented the principles of differentiated instruction in her inclusive first grade classroom, using on-going data to inform decision making in a cyclical process.

**Method**

Over a period of five weeks, the teacher used the following iterative process. In the data collection phase, the teacher had to complete a self-assessment of current practice and determine the curriculum area of focus. Then the TEC collected pretest data, examples of which included; assignments, tests, observation of performance. For the second phase (data-based planning), the teacher would use data to reflect on areas of strengths and weakness for individual students and engage in identifying at least two differentiated instruction strategies (examples provided in Table 1). In the third phase, the TEC had to implement the strategies for at least a week. As the week came to a close, a data-based reflection followed. The format of the reflection was for the candidate to use performance data collected during the week to identify who has and has not been successful. They would then reflect on why these students were not successful and identify differentiated instruction strategies to better align with students' weaknesses. They would then present the lesson plan for the upcoming week to the instructor of the course. The phases outlined above would then be repeated for the duration of the five weeks.

**Results and Discussion**

The case study describes three distinct phases of data collection, data-based planning, and implementing differentiated instruction. It is, however, important to note that after the first week of implementation, the teacher cycled through the phases on a lesson-by-lesson basis. For example, the teacher would have a data-based plan for a single lesson and implement differentiated instruction activities. She would then continue with the cycle by collecting student achievement data related to her teaching and use this for data-based planning for the next lesson.

*Data Collection*

As noted earlier, data collection included: (1) pre-assessment of the students' current challenges and strengths within the math class, (2) a self-assessment of current strategies that were being used within the classroom, and (3) on-going assessment and goal planning. The pre-assessments of the students and the self-assessment provided a baseline for evaluating student and teacher candidate change. The on-going assessments ensured that data-based planning were a part of instructional decisions.

*Pre-Assessment: Students' Backgrounds.* As an instructional tool, the pre-assessment narrative provided a brief but instructive baseline of many of the needs of specific students in the teacher's class. The data collection required the teacher candidate to provide informal assessment data perceived to be of instructional importance to the teacher. For example, in the TEC's inclusion class of over twenty children, data were provided about Caleb, Theo, and Rachel (all pseudonyms). A description of one child is presented here.

Caleb liked to spend his time screaming that he *gives up* or climbing up your body to give you a huge hug. He has not been able to focus in any setting without constant redirection over the prior four months (psychological/psychiatric appointments were trying to re-arrange medications). Other students were familiar with his changing moods, hyperactivity, and constant need to be recognized. He had difficulties socially and with anything that was tedious, often resulting in behavioral challenges. It was noted that one way to keep him on track was to consistently call on him to provide answers during whole group instruction. He was very knowledgeable and as long as the teaching was to his level, he would master the content. He had extreme difficulty with handwriting or any paper form of work.

Theo had been without adequate medication for his ADHD for several weeks. This, in conjunction with difficulties in comprehension and retention, made it extremely difficult to help him learn. He enjoyed whole group activities that were lively. Theo liked to try to fade into the background that often had the effect of losing focus on the lesson.

Rachel was a year older than the other 1st graders, but struggled intellectually. When first meeting Rachel, the typical perception was that she wouldn't struggle with her academic work because she was very socially adept. With trying to recognize money, she was the only student in class that did not know which coin was the penny and she consistently missed the dime, no matter the number of drills we did or different forms of teaching we used. She had significant trouble counting by 5's. Rachel enjoyed being acknowledged in the group to the extent that she always raised her hand to answer, even when she was unaware of the answer. She posed her answer to questions in question-form which indicated that she was not sure of the answer. She seems to have *blocks* when trying to learn certain things and I never know what the blocks will be until we get to a certain part of a lesson.

*Self-Assessment.* To complement the pre-assessment student information, the teacher was asked to engage in a self-assessment activity, reflecting on how she was currently meeting the needs of her students. The reflections were noted in a journal and formed the text for data collection and analysis. Excerpts from the journal are provided here to indicate how the teacher was varying strategies and environmental accommodations to her teaching.

The teacher candidate noted that the first graders seemed to struggle the most in reading and math, especially given that the math taught was largely word-problems oriented. The teacher identified additional challenges with retention, comprehension, and socialization. With regard to specific strategies, the teacher candidate noted in her journal:

> *When activities are more challenging, they use manipulatives to help them learn concepts. Caleb's writing is extremely difficult to read and he becomes very frustrated with this work so spelling tests are administered to each student using oral and written knowledge. This particular student uses a white board and expo marker to spell his words. The bigger grip of the marker, and the larger size of the board, assists him when writing the words. At times this becomes problematic, so he then scribbles all over the board and writes the word with his finger in the scribble (which erases the expo only where his finger travels).*

Additionally, the TEC's journal notes indicated reflections about environmental strategies:

> *It is understood that some students can get out of their seat to move if needed, as long as they are not disrupting other students. It is also understood that some students are allowed to work alone while others may be in a group. But this does not occur with every project or lesson. Goals we constantly work on are socialization and the ability to follow classroom rules so that they can understand expectations within a general education environment. I quickly came to understand that independent work is something we continuously strive to achieve when working with six year olds. Those that are able to partner learn from each other with the study buddy system, but this does not work for every student. So I continue to seek ways to lessen the dependence on a teacher and encourage their independence to learn in their own way.*

In this snapshot of her students, the candidate described a variety of challenges the three students faced and identified differentiated instruction strategies that she has already used successfully.

*Goal Setting.* The goal setting phase required a detailed child outcomes-based focus that used data collection, analysis, and interpretation of results to set individualized goals. The outcomes were to be associated with state standards and typically followed the form: *Students will be able to [identify the object that is heavier or lighter and longer or shorter]* or *Students will be able to [add double digits correctly]*. A more detailed description of the relationship between goal setting and on-going assessment is provided in the following section.

*Data-Based Planning.* There were three primary directives for the assignment that helped focus the candidate's data-based planning. First, there was a need to start with a focus on how children are grouped and the role of individualization. Next, a variety of assessments needed to be developed in order to obtain a detailed picture of student learning. Finally, there was on emphasis on structuring the lessons to achieve quick success with the differentiated instruction strategies. Examples of each follow.

*Grouping.* There are many differentiated instructional strategies based on adjusting the content of the lesson, the instructional process, the student product, and learning environments. Adjusting the way that students are grouped is frequently adopted by beginning teachers as their first attempt to differentiate their instruction. Although there are many ways to group students (e.g., interests, roles, complementary skills), Blozowich (2001) found that teachers that start to utilize differentiated

instruction often structure their classes so that students are tracked by ability. To counteract this tendency and help keep the focus on individualization, assessments were used as a focus for planning for the following week, but with Teacher S's specific students in mind.

*Assessments.* Tomlinson (cited in Willis & Mann, 2000, p.2) noted that one intent of differentiated instruction is for all students to learn the same core content and concepts but with varying levels of complexity. To capture this intention which mirrors the ideals of inclusion, the TEC was required to develop different types of assessments to determine what children knew, the depth of their current knowledge, and determine the degree of progress toward the goal for each child. This necessitated the development of a variety of on-going assessments that lead to adjustments of day-to-day teaching and planning for the following week. The following is an example of an outline for a week's focus on the topic of measurement (determining which of two objects is heavier or lighter) where on-going formative assessments guided choice of, and expectations for activities that then provided further data.

First, the TEC had to identify different opportunities for assessment within a class period. The candidate developed a pretest to determine current levels of knowledge. A lesson would start with a whole class review of any homework and checked individually with students that had incorrect answers. Class work was reviewed with each student to determine specific gaps in understanding where guidance was provided on the work and returned to students to correct, then re-collected to use for data collection. Observation followed with small group and whole group games. An example from the TEC's journal noted that she used a computer game called *Stop the Clock!* that required whole group participation as an introductory element for teaching time. The children would work on activities that came from a commercial math program used as a review/remediation strategy. Other activities included math games that involved individual and collaborative group work linked to using money in a functional capacity.

Within each of the opportunities for assessment, there were opportunities for the TEC to vary the type of assessment in response to the needs of the children. For example, the following assessment variations were in the TEC's journal:

> *IEP testing accommodations were utilized by shorting assessment length, chunking assessments, and allowing a particular student to indicate the answer by giving it orally or pointing to it. More observational assessments were employed through activities. Testing accommodated the student by occurring in an area with very few distractions if needed.*

The assessments became a structured opportunity to evaluate effectiveness of teaching in a continuous and synergistic way. The pre-assessments helped to identify current levels of achievement and pinpoint individual needs. The self-assessment complemented the pre-assessment as it helped to keep the focus on the teacher as the change-agent in a child's learning. Finally, the on-going assessment becomes a synergistic process with data-based planning that integrates individualization with a standards-based curriculum.

*Quick Success.* Tomlinson (1995) recognized that for teachers to want to continue to use differentiated instruction practices, it was necessary for them to experience success quickly. The TEC's journal indicated that prior to her participation in the initial certification program; routine assessments were administered weekly after reading the selected text throughout the week. These were followed by a standard test for all the students in the grade level. The assessment was summative and did not provide enough detailed information that would allow for any form of individualization. Soon after being asked to vary how the children in her classroom were assessed, a different measurement of the success in the teacher's classroom was noted in her journal:

> *Because of this simple differentiation technique of using an assessment designed for Caleb, his other reading abilities improved. He demonstrated more confidence in his ability and would make more attempts to learn. He truly enjoyed seeing the actual graph of his learning and asked to see it again on a regular basis. I employed this technique with the rest of my students and watched them exceed my expectations when they were able to witness their own growth and improvement. I continue to use this method of data collection, student and parent conferences, and goal setting in the new year of school.*

*A Systematic Approach to Individualization*

As stated previously, differentiated instruction can be neatly organized into Tomlinson's (2000) categories of content, process, product, and learning environments. As any of the four options in any

combination can be used, Table 1 provides examples of differentiated instruction strategies within each category. The list is not meant to be inclusive of all practices, but serves as an example of how the TEC organized differentiated instruction in her classroom.

**Table 1**
**Examples of Differentiated Instruction Strategies by Tomlinson's Categories**

| Content | Product |
|---|---|
| • Varying reading materials<br>• Reorganizing content - Describing similarities, categorizing into groups, developing abstract thought.<br>• Student "skipping" acquisition phase to "application" phase<br>• Varying by student interest | • Working alone or in small groups on different "products" e.g., giving a speech, creating a model, create a flyer<br>• Encouraging creation of individual products that contain "aspects" of the assignment<br>• Providing expectations that allow for varying degrees of difficulty, meaning, and procedures<br>• Providing rubrics that are developed based on varying skill levels |
| Process | Learning Environment |
| • Varying how much support we provide each child by how much they need<br>• Using graphic organizers, concept maps, or charts.<br>• Using tiered activities to incorporate the same skills<br>• Using centers to allow further learning of current lessons<br>• Using student-specific task sheets (agendas) written for whole class and individuals<br>• Using manipulatives and hands-on activities<br>• Presenting learning through different means. e.g., audio/visual – vary text size, color contrasts.<br>• Varying time and support for specific tasks | • Asking, "Where do you do your best thinking?"<br>o Is it a quiet place or a crowded place?<br>o A small space or a big place<br>• Asking, "Where do you do your best learning?"<br>o In a "homey" place – on pillows, in a tent.<br>o On the floor or in a chair<br>o In a structured place<br>• Including structured guidelines so that students are more comfortable in familiar settings.<br>• Creating a positive learning environment by incorporating materials that encourage student collaboration<br>• Establishing routines that are so consistent that they almost become tangible |

In order to start the systematic differentiated instruction process, an important part of the planning process was to develop class-wide activities and strategies that would hone in on individual learning. Table 2 (next page) shows the range of activities developed for the inclusion class for one of the five weeks. The activities are often a short description of the flow of a lesson with the strategies listed as a more-detailed description of how the teacher wishes to group or individualize instruction.

The realization that simple changes can produce large effects was evident. The TEC experimented with learning environments and found that changing some simple things played a large factor in the depth of understanding reached by the students. In her journal, she noted that when she altered the learning environment and created a surrounding conducive to calm learning that *I am better able to reach my students. It is one of the EASIEST ways to differentiate, but one that is nearly ALWAYS ignored*.

With assessment-driven activities and strategies, the TEC exhibited a shift in thinking about the teaching learning process that cuts to the heart of data-driven instruction. In the following descriptions of Caleb's progress from the TEC's journal, it is clear to see how her narrative evolved to focus on specific objectives, gains in scores, assessment results that were progress oriented, and related to the effectiveness of specific strategies:

*Caleb did extremely well with weight in the form of a scale measurement and determining which of two objects is heavier or lighter. There were times we had to rein him in because he was getting bored with the lesson when others were not able to understand as he did. Caleb did very poorly on the weight estimation. He would not guess in any pattern (always over or always under) as Rachael did. Instead he would seemingly pick numbers randomly and then become very upset when he was nowhere close to the estimation. In order to appease him and his near loss of control we would call on him to answer the simplest problems such as a paperclip weight or a pencil weight. But this only worked briefly until he did not estimate well when the majority of the class would. He is very hard on himself when he gets something wrong and tends to launch into a loud verbal fit or hide under his desk. Caleb did very well with length and was able to demonstrate understanding of shorter and longer. Caleb has great difficulty with anything requiring the use of his fingers to conduct a fine motor skill (writing, cutting, coloring, etc.), so he had difficulty measuring with paperclips. He allowed others to help him lay them out and was able to determine the length of an object when measuring with paperclips.*

**Table 2**
**Example of Weekly Planning for Math Differentiated Instruction**

| Day | Activities | Strategies |
|---|---|---|
| Monday | -Review of double digit addition: whole group<br>-Complete small group activity of double digit adding with cents<br>-Introduce double digit subtraction | Students will be involved in a hands-on lesson of capacity. Although this will be a brief lesson (due to all performing well on this unit in the pre-assessment) the students will be able to move around and physically fill units to determine capacity.<br><br>Center activity (small group) will be geared to re-teach/review of material of counting by 10's with 10 more and 10 less on a computer game. This will be for every day of the week.<br><br>Center activity with money involving adding double digit double amounts to equal one dollar after dice is rolled.<br><br>Center activity using MegaMath to review double digit subtraction.<br><br>Center activity with game to review fact families. Students will create houses and the main numbers will be the roof while the facts support the house.<br><br>Independent work will focus on review combined with the current lesson. This will allow the students to work at their pace and schedule. |
| Tuesday | -Review of previous day's lesson on double digit subtraction<br>-Assessment of double digit subtraction<br>-Introduction of capacity | |
| Wednesday | -Review of capacity<br>-Hands on activity involving capacity | |
| Thursday | -Assessment on capacity<br>-Review with indoor game for odd/even and adding /subtracting double digits<br>-Split into groups for those that need remedial instructional work | |
| Friday | -Timed worksheet of math facts worksheet<br>-Hopscotch game of skip-counting | |

**Conclusions**

In a special issue of *Teachers College Record*, Rust (2009), reminded us that *To practitioners, research-informed pressure for changes in practice often seems unrelated to what is needed in day-to-day and minute-by-minute interactions* ( p. 1882). Asking teachers to: (a) conceptualize the challenges of their day-to-day and minute-by-minute teaching and (b) choose and implement evidence-based practices in a systematic way, is a vision of research that has the potential to affect local policy in ways that the traditional top-down approach hasn't in the past (Lytle & Cochran-Smith, 1992). This approach has the potential to bridge the research-to-practice gap (Lytle & Cochran-Smith). The teacher in this case study successfully broached the research to practice gap using differentiated instruction as an effective way to meet the needs of all of the children within an inclusive setting.

Several specific changes to the TEC and the children's learning occurred as a result of the using the practice in research model. First, the TEC reflected that over a course of five weeks, she changed her perspective about the role of planning to affect individual and classroom change. At the beginning of the second week, she noted in her journal that *I am not proud to admit that this was a new experience for me. Prior to this course, lesson plans were derived and written based on the next item that needed to be taught and the 'pacing map' for when the items should be taught.* The process led to that *aha* moment where the TEC not only knew why they should let on-going data collection help guide planning for instruction, but realized the effectiveness of this model for her children. She wrote that there was a *sudden realization of 'what were we thinking?!' … of course we need to focus on the remediation of this before trying to move on.*

There was also a shift in how she (as the inclusion teacher) and the general education teacher collaborated together. Once both teachers realized the potential of differentiated instruction, the TEC wrote in her journal:

> *From that point on, my co-teacher and I worked together to come up with new strategies for remediation and more effective teaching. We established a specific time every morning in which we split the students into four groups in the room … We agreed that the students worked better in smaller groups.*

The TEC also noted other areas of development, such as assessment design. She wrote in her journal that it took little time to realize that prior to the differentiated instruction five-week assignment; she was testing whether students could *take tests* rather than assessing content knowledge. The subtle shift of using a different type of assessment also led to unexpected changes in behavior:

> *A prime example of this came to light with the reading tests administered weekly. Shortly after beginning the semester, I was grading one of the tests and was disappointed because Caleb did not do as well as I thought he would. When discussing the book with him the day before he seemed to fully grasp the reading and comprehension was apparent. So I wondered why it always seemed this way, yet he never seemed to pass the test. As if on purpose, assessment design was a topic of the course during that week. I immediately compared the situation with what I was learning and realized I needed to find another way to truly assess the comprehension for this student. I decided not to use multiple choices after watching him closely as he took the test. He knew the answers because he was able to talk to me about it the day before. The problem was his self-doubt and the fact that another answer looked a little better. The next week I attempted a new assessment strategy by asking him open-ended questions about the story. The same types of questions were on the regular assessment, but I did not provide multiple answers. I simply took down his answer specifically. His accuracy and comprehension were amazing. He went from failing every single test of multiple-choice, to an average of 90% on the short answer assessments I gave. He never failed another comprehension test. Even his behavior changed. Prior to the assessment change, he would become very frustrated while taking the test and start shouting, crying, or tear his paper. Once the assessment style changed, there were none of these behaviors in relation to the testing. This student passed for the year with a much more accurate grade for the skills assessed; there is no doubt in my mind that he would have failed if I had not had the knowledge to attempt a different assessment design.*

Tomlinson (1995) noted that one of the barriers to implementation of differentiated instruction is the perception that differentiated instruction is yet another fad. The fundamental shift from the traditional top-down deductive model of *if it works for most, hopefully it will work for the individual* to a more inductive *if it works for one, then we will see if it works for all* approach is a reflection of a universal design feature within an inclusion classroom. This develops the potential for teachers, who are often seen as more *authentic* to other educators, to advocate for differentiated instruction from their position in the classroom.

Finally, although the case study for a single TEC and many of the challenges described for Caleb are easily identified as characteristic of students with disabilities, they nevertheless describe behaviors that most students have at least some of the time, and most teachers have to respond to, whether special or general educators. Whether the challenges are keeping children on track, helping children who are having difficulties with comprehension and retention, or working with children who have difficulty with anything they perceive as tedious (such as paper-and-pencil tasks), strategies that are likely to work for these children are likely to work for all children. In a similar vein, the strategies identified that were successful with these children with disabilities, including whole group activities that are lively;

being acknowledged in the group; and presenting content at a level or in a form that reflects a child's developmental needs are likely to be beneficial to all children.

*Limitations and Areas for Future Study*

Among other strengths, case studies have been acknowledged as a powerful method for understanding complex inter-relationships among phenomena, can help to identify processes in causal relationships, and have the potential to explore the *lived-reality* of teachers within schools (Hodkinson & Hodkinson, 2001, p. 3). The authors also noted several limitations that should be considered when using case study designs. First, over a period of the semester, a large amount of narrative data from the journal was collected and whether one presents themes from across the data or individual narrative accounts, there is a potential for bias in the evidence provided. Although the data were checked for credibility and trustworthiness (Brantlinger, Jimenez, Klinger, Pugach, & Richardson, 2005) through investigator triangulation and second level member checks, there is still the potential for bias in the interpretation and reporting of results. It is also important to document that although the researchers did not have access to the data journals until the candidate finished her degree program, the teacher education candidate was recording information in journal form for class credit.

A second limitation is the generalizability of the results. Data were drawn from a single candidate in an online master's degree initial certification program. As Brantlinger et al. (2005, p. 203) discussed, the purpose of qualitative research is to *produce evidence based on the exploration of specific contexts and particular individuals [and that] it is expected that readers will see similarities to their situations and judge the relevance of the information produced to their own circumstances*. It would therefore be up to the reader to determine whether the processes described in this article could apply to their own circumstances. Future research could also determine the degree to which similar results are obtained with varying populations of students and teacher education candidates.

Third, the data were collected over a relatively short five-week period to time. Even though the intent of the research was to provide immediate results to the participant concerning the effects of differentiated instruction (Brimijoin et al., 2003), it is recommended that further research explore the long-term effects of the on-going assessment differentiated instruction model described above. Even though second level member checks alluded to maintenance of differentiated instruction, this needs to be studied in a more systematic way.

Finally, there was emerging but limited evidence that differentiated instruction as a process was accepted by both the special and general education teacher. The special education teacher noted in journal form that the general education teacher worked more collaboratively with the special education teacher to implement differentiated instruction with all of the students. Future research with a larger sample of teachers could explore the role of differentiated instruction as a universal design component. With the seemingly global move toward inclusion (UNCRPD, 2006), additional research about the effectiveness of differentiated instruction could help bridge general and special education and help clarify the role of the special education teacher in a collaborative inclusion classroom.

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