# Differentiation in the Digital-Based Classroom: A Universal Design Approach for Inclusive Settings in Middle Schools

Kathleen M. McCoy[1] & Sarup R. Mathur[1]

[1] Mary Lou Fulton Teachers College, Arizona State University, Tempe, Arizona, USA

Correspondence: Sarup R. Mathur, Division of Educational Leadership and Innovation, Mary Lou Fulton Teachers College, Arizona State University, Tempe, AZ, USA.

## Abstract

Teachers across the world have become barraged with various techniques to meet the educational needs of multiple subgroups, e.g., autistic, behavior disorders, English Language Learners (ELL), gifted. They have the responsibility of creating environments in which learners become more knowledgeable and skilled from the time when they entered the classroom. For the current and future generations of learners and their teachers, the emergence of technology has created new prospects for accommodating the learning styles of diverse classrooms. The versatility of technology can be used to organize and design material that promotes successful acquisition and retention of expected middle school content within the inclusive settings. In this paper, the authors provide a greater understanding of how technology can be an effective change agent for learning in middle school inclusive settings. Suggestions are included for teachers' capacity building to integrate technology to accommodate diverse student learning needs and styles.

**Keywords:** universal design, differentiation, technology, taxonomy, teachers, middle school

## 1. Introduction

Almost 15 years have passed since Ms. Leonetti, clutching her master's degree in hand, proudly marched to the tune of Pomp and Circumstance. Five years earlier, she had earned her bachelor's in education and continued her professional development in her content specialty. By all definitions, Ms. Leonetti would be considered an outstanding middle school teacher, all definitions but her own. Her students seemed either bored or apathetic, and quite frankly she was beginning to feel the same way. Initially, the student population at her middle school was clearly middle class with children who were from backgrounds similar to hers, but with an increasingly accelerating rate, a much wider variety of learners with special needs and experiences continued to emerge. Her classroom was like a kaleidoscope of cultural heritages, special learning needs, and a variety of socioeconomic levels, languages, and widely disparate social and cognitive ranges. In fact, the atypical had become the typical. As a lifelong learner, Ms. Leonetti has recognized that the composition of her classroom has been transforming yearly and has tried to keep abreast of the current research and the newest techniques. She is aware of the various skill levels of her students and that although important to address the curriculum, she feels that many of her students are simply counting the minutes till the dismissal bell buzzes. Engagement in curriculum content appears superficial at best for many. In contrast, sometimes it seems that all her students want to do is play video games and link to friends through any number of social media venues. One look at her students during breaks, points clearly and irrevocably toward technology as a great leveler, almost certainly accommodating her middle school students' many diverse skills and lifestyles.

Technological skills which, with the exception of the weekly computer lab, represent knowledge often acquired beyond the brick and mortar schools. The majority of her students are self-taught technology experts. Technology, outside of the classroom, is clearly motivating to her students, as noted by the ever present cell phones at their ears and the constant clicking of many tiny keyboards. Text messaging, online social networking, and computer gaming seem to be an essential part of her middle school students' lives (Gutnick, Robb, Takeuchi, & Kotler, 2010). Ms. Leonetti knows that successful learning must include powerful motivators. Clearly technology is motivating, but how can technology be infused in the curriculum and simultaneously meet the diverse social and academic needs of her students?

Fighting the urge to be overwhelmed by the challenges provided by the learners in today's schools around the

world, teachers like Ms. Leonetti are reminded of their love for teaching and vows to revitalize their instructional design, delivery and evaluation of the curriculum through the incorporation of technology. Ms. Leonetti understands that she must embrace the role of technology as a major means of facilitating her students' knowledge base. She must incorporate what she knows about learning practices and principles to groups of middle school students who have been born into and are growing up in a world connected by technology (Grail Research, 2011), but how can technology go beyond entertainment and move comfortably into the classroom? The purpose of this paper is to provide a framework for incorporating technology, on and off line, through a greater understanding of how digital instruction can be an effective change agent of learning for at-risk middle school students. The first step for Ms. Leonetti and others is to analyze the commonalties among their students, that is, identify the characteristics of middle school learners and how these traits are in alignment with technology.

## 2. Characteristics of Middle School Students

An understanding of specific aspects of preadolescent development as well as prerequisite skills for course content objectives is necessary before hopping on the technology train if teachers are to provide ethical and effective services to middle school learners (Shokouhi, Limberg, & Armstrong, 2014). The transition from elementary school to middle schools adds the dimension of children who are straining to define their world from an internal perspective, increasingly developing their own logic and internal reality and lessening their dependence upon reinforcement and validation by adults. Appropriate instructional strategies must take into account an understanding of the pressures and developmental variability of preadolescents regardless of categorical niche.

Clearly, most middle school students are enamored with technology, but how can incorporation of digital experiences be aligned with the widely varied developmental levels of our middle school students? How does the ever burgeoning variety of labels which fall under the purview of at-risk, such as, autistic, behavior disorders, English Language learners, gifted and normal affixed to the files of so many middle school learners add to or detract from our understanding of social and cognitive needs? To answer these questions, we must first gain insight into the characteristics of typical middle school students and then decide how or if the added at-risk labels are instructionally relevant in the everyday reality of classroom instruction. Ironically in order to move forward, we need to travel back to the most common models cited in the literature which are used to describe stages of childhood cognitive and psychosocial development. We look to Piaget and Inhelder (1969) for insights into cognitive development and to Erikson for psychosocial stages (Erikson, 1950). As any middle school teacher can attest, the developmental changes occurring during preadolescence is fluid, that is, variability exists in developmental capacities for children with the same chronological age but perhaps nowhere more dramatic than during middle school (Wood, 2007). In essence, learners in preadolescence can be found at two extremes of a developmental continuum and anywhere in between. At one end of the developmental continuum are those learners who still need external validation especially from their peers and teachers. Many learners who are at-risk, especially those receiving services for cognitive challenges and social challenges, such as learning disabilities, autistic, behavior disordered or intellectual disabilities, fall into a more dependent maturational level. At the other end, we have learners who are using and experimenting with internal validation finding themselves increasingly relying on logic while discovering a growing sense of independence (Greenspan, 1993). Ironically, some of the very same students who have been categorized as learning disabled, autistic, or behavior disordered are also at-risk due to their need for independence and exploration as they move into the adult world.

Preadolescent developmental variability necessitates an understanding of maturational cues to effectively choose appropriate digital strategies (Shokouhi et al., 2014). Given a normal distribution of behavior, we can safely say that we will find at-risk students also reflect a similar maturational curve. Looking more deeply into factors that have accounted for the at-risk label, the primary focus is on behavior that in some manner is affecting successful academic or social societal expectations for grade level performance. Cognitive issues, such as reading comprehension problems or disorganization, can be found in any at-risk category. Behavioral issues such as oppositional defiance or compulsive obsessive behaviors also can be found with any at-risk student, not just those who have fallen into a special education category. Academic or social skill challenges appear in behaviors that may require special adaptations. Barriers to learning in a traditional middle school inclusion setting may include information overload, processing issues, or distractibility due to over stimulation caused by the character of inclusion classrooms, e.g., demands of social interactions, extraneous sounds or other potential distractions. The increasing number of students with learning and behavioral issues, e.g., autism or attention deficit disorders, demands that instructional strategies take into account characteristics of the learning process that inhibit access to information presented through customary face-to-face instruction preventing student success in the classroom.

### 3. Technology, Teaching, and Learning

Fortunately, for the current and future generations of learners and their teachers, the emergence of technology holds promise in education for addressing the learning styles, developmental levels, and at-risk variables of our learners in diverse classrooms. An environment heavily invested in technology allows for multiple formats which can provide alternative environments in which students can engage in virtual settings accounting for atypical learning approaches and reducing face-to-face situations which can be intimidating. Learning can be enhanced through less threatening technology-based strategies for at-risk and atypical learners through individualization as well as developing the student's knowledge base through engagement in collaborative virtual communities.

*3.1 Universal Design Learning (UDL) Model*

A particularly appealing pedagogical approach toward education is found in the UDL Model. UDL is an approach in which all students are set up to be successful in advance through teacher planning. In UDL, the intent is to increase learning through the alignment of techniques and materials for individuals exhibiting multiple abilities and strengths through planning prior to the students' arrival on the first day of class. In UDL classrooms, teachers plan the highest achievement for all learners without regard for labels by no longer "teaching" to the middle group of achievers, but rather plan for learner success (Stanford & Reeves, 2009). Rather than making modifications to existing material after a particular student has experienced failure, UDL is based on the premise, teachers should plan ahead, anticipate student needs and create settings so that material can be developed to account for any type of academic or social skill needs of any student who enters the room.

UDL is based on the architectural concept that building a house initially which is accessible to any home dweller is more economically and ethically efficient than adding components for individuals after the fact. In an UDL based home, for example, a small adjustment to the placement of electrical switches could be made so that they are in the range of an individual who uses a wheel chair. The switches are functional regardless of the height of the new home owner.

Application of the UDL model in education posits that each learner is successful from the first day of class and builds upon that success throughout the year. In other words, UDL is a proactive rather than reactive approach. The intent is to design classrooms and curricula which facilitate participation of individuals with a variety of abilities and strengths as they are learning, anticipating the most effective approach for student learning by making sure that the essential instructional protections have been established. UDL models take into account possible at-risk behaviors such as poor reading skills, distractibility, lack of prior knowledge, and build these safeguards into classroom materials. By having safeguards in place, the teacher will not have to be scouring for new material but rather can discriminate among material representing a range of skill needs. In the unlikely possibility that all students have excellent reading skills, the teacher can simply not use materials to boost reading skills but go directly to other material that pertains to current students. The teacher will have the reading material ready for any learner that needs the support, whether that student is a transfer or for students in the next year's classes. The goal of a UDL classroom is to create a learning environment in which success is a constant companion for each learner (Haley-Mize & Reeves, 2013; Lieber, Horn, Palmer, & Fleming, 2008). The teacher's goal is to plan for student success rather than wait for learner failure (Stanford & Reeves, 2009). To achieve this goal, partnership with technology seems to be obvious. Who, after all, would not want an electronically organized toolbox of quickly accessible materials and related strategies and assessments which increase the probability of student success (Hitchcock, Meyer, Rose, & Jackson, 2002; Stanford & Reeves, 2009)?

*3.2 Technology and UDL*

The versatility of technology is the core of digital instruction and can be used to design material that is individualized, interactive or collaborative taking into account specific factors that enhance individual acquisition and retention of expected middle school content for all students. The UDL model is based on the premise that the teacher plans ahead anticipating and reducing roadblocks to learning before students enter the classroom. In other words, a teacher can anticipate ways to avoid student frustration by providing material in which the learner will be successful.

This anticipation initially is based on the understanding of the demands of the content to be learned. The critical content is that content that the students will need in order to advance to the next level, in the material of the current classroom as well as material that will be needed in future units or courses. In lieu of designing programs where students are bound to fail first and be corrected later, the mantra of the UDL classroom is "Catch them being smart!" Not too surprisingly by "catching the student being smart", a spread of effect occurs in that the students are also found "being good". Students who are at-risk of failing academically begin to be successful, a

lot of inappropriate classroom behavior diminishes or disappears altogether.

Another mantra found in a UDL model is, "Catch a teacher being organized!" Organization requires some kind of structure for organizing critical content beyond that provided by the textbook publishers. One framework teachers can use for analyzing critical content is Bloom's Taxonomy (1956). Several educational psychologists collaborated with Benjamin Bloom to publish the Taxonomy of Educational Objectives. They listed in ascending order 6 skills critical for the development of cognition: knowledge, comprehension, application, analysis, synthesis, and evaluation. This taxonomy was revised almost 45 years later (Krathwohl & Anderson, 2010) to provide a more dynamic vision of cognition by changing the order to remembering, understanding, applying, analyzing, evaluating, and creating. Remembering and understanding are generally thought of as lower order skills and applying, analyzing, evaluating, and creating are higher-order cognitive skills. The exact relationship between the higher order skills is the subject of debate; some feel they are hierarchical others think that they are parallel, but in any event almost everyone considers these higher order skills important in the development of higher-level learning and that lower-level skills are needed before advancement to higher-level skills (Sweet, Blythe, & Carpenter, 2016).

*3.3 Taxonomy and UDL*

The taxonomy fits very well with UDL for learning in that the organization provides a framework for analyzing course content. Without focusing on any particular student or group of students, the taxonomy focuses on the content and how to develop the content from lower order to higher order levels. Given any subject, the teacher can analyze the content either on a unit by unit basis or on a year-long basis utilizing the taxonomy. The teacher can begin with lower-order or higher-level skills as long as the entire taxonomy is analyzed for the content. The material can be designed for in-class activities and homework. In fact, an appropriate use would be to create evaluations based on the taxonomy that can be ultimately used for identification of the most appropriate cognitive level of instruction for students, i.e., the point at which the student is successful. Once students enter the classroom, this evaluation can be used to determine the individual level and type of material that best fits learners' needs.

Alignment between what the learner knows and what the learner is expected to know complemented with appropriate instructional material can pave the way to effective learning for all students which in turn lowers their at-risk status. All learners have the same opportunity to reach higher-order skills to develop deep learning but each student may begin advancement at a different level. Rather than keeping all students at a surface learning by providing instruction with lower level skills or focusing solely on higher order skills, when provided with instruction that aligns with the individuals current level of understanding, boredom and frustration will be reduced while engagement and learning will be enhanced.

*3.4 Differentiated Instruction and Technology*

Differentiated instruction replaces the "one method fits all" approach. "All students" is an inclusive concept, and accordingly requires thoughtful consideration of differentiated instruction. Students, for example, who have difficulty understanding the primary language of the classroom may initially need to acquire lower-order skills before advancing to higher-order processes in their second language. As student needs are identified, anticipated material which has already been prepared for students needs attention to language, such as ELL or children with language deficits due to environmental or genetic background can be provided. Such students, for example, can be given verbal communication which has been scaffolded with pictorial models. Students who need more time to process auditory information or become overly fatigued when reading or writing can be provided with assistive technology by means of voice dictation programs.

Differentiated instruction not only allows the teacher to use an assortment of instructional formats but also allows the students to demonstrate their knowledge base through a variety of presentations. In place of writing a five-paragraph essay related to the latest unit of instruction, the learner can demonstrate knowledge through a PowerPoint presentation or schematic representations like semantic mapping. For the learners whose knowledge base needs to be strengthened, technology by means of videos aligned to topical content can be shown prior to introduction of new material. For the learner whose vocabulary needs expansion, various practice activities by means of computer games, puzzles and matching formats can be found or created as part of the instructional material.

For instructional development purposes, lower-level skills which involve remembering and understanding are most likely associated with simple verbs like identify, match, describe, write, distinguishes between and other terms that indicate basic understanding, whereas higher-order cognitive skills will require applying, analyzing, evaluating and creating. Lower-order knowledge is relatively simple in that essentially one answer is correct and

is easily identifiable. Content is often found in an orderly sequence of skills. Vocabulary, basic facts, and simple procedures fall under the umbrella of lower-order cognitive skills. When planning for a UDL classroom, at a minimum, lower-order tests should be in place prior to student entry. Technology for lower-order evaluation and knowledge acquisition is relatively abundant and often comes with curriculum texts. Lower-level technology may or may not require access to the Internet.

Higher order skills, in contrast, target learning outcomes that are complex with a continuous development of understanding. Identification of all specific behaviors involved in complex higher skills is virtually impossible to identify which leaves the teacher to be the determiner of which type of content best represents the curriculum. In order for the teacher to get a sense of the student's ability to do higher order thinking, evaluations can be prepared using specific verbs like construct, produce, design, plan or any other verbs that require the learners to create, evaluate or analyze. An important factor in the higher order evaluation tool would be a component related to reflection upon the assignment (Fink, 2013). Technology involving activities related to the development of higher order cognitive skills most often requires access to the Internet.

Development of higher order thinking skills is clearly one place where technology is advantageous. Driven by world-wide adoption of the Internet and rapid development of digital tools, web based technology is altering how we communicate, locate information, and connect with others professionally and personally. Learners can collectively participate in the innovation, creation and social development of almost any area of human interest, for example, the arts, culture, science, government, the economy and education (Tapscott & Williams, 2008). Although most research has indicated findings relative to web based instruction as used with adults in higher education, these results have implications and practical value for extension into the middle school environment (U.S. Department of Education, Office of Planning, Evaluation, and Policy Development, 2009).

## 4. Using Technology in the Middle School Classroom

Cognitive research indicates that technology promotes active engagement, participation in groups, frequent interaction and feedback, and connections to real-world contexts (Roschelle, Pea, Hoadley, Gordin, & Means, 2001). Technology not only has the potential for engaging students while interacting with others but also can result in constructing meaning and knowledge (Sherman & Kurshan, 2005). A bonus for using technology is that teachers can provide access to the content for higher level students that exceed the scope of the class. Students with intense interests, often labeled autistic or gifted, can pursue such content through online communities of others with like interests. In fact, in areas where teachers may not have been prepared as thoroughly as they had wished, knowledge can be supplemented by using digital technology to reach out to others who may have more expertise.

### 4.1 Higher Order Skills

Higher order learning activities are often found in interactive and collaborative student activities. Common uses of technology such as digital gaming, problem solving, and social networking are engaging students in learning experiences that provide opportunities to (a) discuss, create hypothesize, and test strategies for problem solving; (b) collaborate with other students or experts around the world; and (c) develop higher order thinking skills (Klopfer & Squire, 2008).

Well-designed computer games are enjoyable activities that follow a set of rules to undertake a challenging activity applicable to a wide variety of disciplines (Liu, Cheng, & Huang, 2011; Papastergiou, 2009; Ravenscroft, 2007) which can provide a rich-resource learning environment to develop higher-order knowledge and skills of students (Gros, 2007; Shute, Rieber, & Van Eck, 2011; Wang & Chen, 2010). Studies have also indicated that digital games can play a significant role in the development of the learner's cognition and social processes (Lin & Lu, 2011) while simultaneously enhancing the students' interest and motivation in learning (Berhenke, Miller, Brown, Seifer, & Dickstein, 2011; Brom, Preuss, & Klement, 2011; Burguillo, 2010; Dickey, 2011; Erhel & Jamet, 2013; Huang, Huang, & Tschopp, 2010; Wang & Chen, 2010).

### 4.2 Problem Solving

Problem solving involves a variety of higher-level cognitive skills which may or may not be formatted as a game. Conducting learning activities on the web can develop students' problem-solving ability (Chen, 2010; Kim & Hannafin, 2011). Web-based problem solving typically involve students in activities where they are asked to answer a series of questions linked to a stated issue. Students are expected to identify or create questions related to the problem, determine the keywords, discover potential web resources, choose the appropriate web pages, abstract the related information, and summarize the information (Hwang & Kuo, 2011).

*4.3 Collaboration and Networking*

Pedagogical applications and processes are being incorporated in social media. Social media includes a wide selection of web-based tools, such as, blogs, wikis, media (audio, photo, video, text), sharing tools, networking platforms (including Facebook), and virtual worlds which are used to promote collaboration and information sharing (Arnold & Paulus, 2010; Junco, Helbergert, & Loken, 2011). Interactions can be restricted to a room, school or district or open to national or international locations allowing the students access to develop and be engaged with virtual communities of learners with the goals of expanding their higher-order knowledge base and ultimately increasing their overall learning (Fewkes & McCabe, 2012; Heafner & Friedman, 2008; Liu et al., 2011; Marsh, 2011; Tarantino, McDonough, & Hua, 2013; Yu, Tian, Vogel, & Kwok, 2010). Social media is often paired with gaming and problem-solving activities, but issues with privacy and access can be complicated and are usually determined by district policy**.**

## 5. Preparation for Using Technology

Many middle school students have mastered an extensive use of mobile technology and often are proficient with text messaging, online social networking, and computer gaming as an essential part of their lives they may need teacher assistance in learning how to use these tools for school purposes (Gutnick et al., 2010). A very small group of students at the middle school level are already highly skilled, extremely motivated, and are already using web-based approaches to learning. The majority of students at the middle school level who have mastered lower-order skills will need assistance or guidance for web-based problem-solving activities**.**

*5.1 Assistance and Scaffolding*

Although some research suggests that students who learn in online groups provide scaffolds for one another (Suh & Moyer, 2007), without proper assistance or scaffolding, novice Internet users, especially children, can easily get lost or feel frustrated with the Internet while searching for information (Chandra & Watters, 2012; Chen, 2010; Ferreira & Sanos, 2009; Kim & Hannafin, 2011; Li & Kirkup, 2007; Merrill & Gilbert, 2008). In addition, developing and teaching the appropriate skills required by novice Internet users can take a considerable amount of instructional time. Sensitivity to gender issues is another consideration (Kinzie & Joseph, 2008). In any event, the Internet itself has many sites which share resources, lesson plans and materials (see www.unimaas.nl/pbl for more details).

*5.2 Organization*

UDL, differentiated instruction and Bloom's taxonomy in and of themselves are only as good as the teacher's ability to understand instructional content, learner skills and the aptitude to organize classroom material. Technology plays a critical part through which teachers can create effective and efficient UDL classrooms showcasing differentiated instruction.

## 6. Systematizing Content

Efficient and effective teachers are organized. Whether a teacher is just starting out or a teacher has been instructing for many years, teaching requires the ability to organize instructional materials in such a way that they are easily accessible. Accessibility includes alignment of materials with curricular objectives. Regardless of the content in the curriculum, materials can be organized using Bloom's taxonomy. Teachers can create electronic folders or files for each level of the taxonomy. Material that goes into the files is more a function consolidation rather than creation of new material.

Efficiency requires that teachers reduce the extraneous by merging existing critical materials while simultaneously eliminating nonessential material. A materials inventory, utilizing the "reducing-the-extraneous" principle demands identification of priority content, so eliminating and retaining of key curricular content can be done fairly easily. Reducing the extraneous requires that teachers have a clear understanding of what is expected to be learned.

*6.1 Choices and Options*

Content areas such as those found in middle school provide opportunities to make choices. In choosing essential terms, concepts, or units in content, the teacher needs to determine if the material will recur throughout the curriculum, in other grade level curriculum, or in more advanced curricula. If the material does reoccur then the material is critical for instruction, but if reoccurrence does not occur, then such material can be filed under "Supplemental/complementary".

In a UDL classroom, electronic folders may contain files within files. Much like Russian nesting dolls, a unit would sequentially house files coded and prioritized by objectives and sub objectives. Given that the first level

of knowledge is typically lower order, for example, each file can be organized according to instructional strategies including materials targeting lower order skills such as or basic fact information that are typically presented. Modifications of such strategies can also be identified by learning need, for example, for at-risk students whose experiential knowledge needs to be supplemented. Files indicating material meant to provide background information could include, but not be restricted to, audio or visual tapes with accompanying practice activities. For students who have reading challenges, the audio or visual supports can be used. Filing is not predicated on label for the at-risk student but rather on the at-risk students' entering skills and probability of success with material.

*6.2 Alignment of Objectives*

Master teachers know that curricular objectives are also aligned with the type of instruction that is most appropriate to the content as well as the learners' skills/learning styles. Although the district adopted curriculum provides guidance in what to teach and predetermines grade level expectations, experienced classroom teachers know they have a great deal of flexibility, or at least know how to create a great deal of flexibility, utilizing required classroom structure and materials. Typical classroom structures refer to one-on-one, small group, or large group configurations. Individualization, however, is always based on skill acquisition and maintenance.

Individualization and differentiation go hand-in-hand, however, several students who have the same need can be grouped together. Individualization most often does not mean one-on-one instruction. Teachers can code their material in terms of large or small group instruction as well as indicate where resources can be found, for example, in a particular textbook or handout. The advantage of adding a coding for technology is that many students can be working individually, in a small group or in a large group in multiple areas and levels while the teacher can circulate and facilitate acquisition and maintenance of new knowledge. In any typical middle school classroom, the teacher can create multiple learning opportunities with technology to accommodate the various skill levels of the students. Coding the material by objectives and structures also creates additional opportunity for flexibility relative to skill levels of the students.

Although systematizing files by objectives may seem time-consuming initially, the system is actually time-saving. Once major objective headings and file headings have been set up, a volunteer, and aid or even some of the students can manage the procedure. The process of creating files is additive. Teachers need not gather all material for every unit before initiating a file by objectives UDL/differentiated instruction system. Initially objective headings can be listed for each of the major units and throughout the year the teacher can organize along the way, gathering and filing materials as students progress throughout the year. By the end of the school year, teachers may not have all folders with totally completed files but will definitely have a good start and also be able to add material for specific needs of specific kinds of students, that is, children who are distractible, learners with sensory issues, students with language needs and or students whose knowledge base far exceeds that of the required curriculum. No one said a UDL classroom was built in a year. The good news is that filing by objectives allows the teacher to collect materials they can be used with current and future students.

## 7. Building Teaching Capacity

With respect to material, most general educators did not set out to teach children with at-risk students, many of whom fall under the eligibility criteria for special education or ELL services and that means that the frontiers of our understanding must be expanded beyond the concept of the one room by one room schoolhouse. Although some training has been provided to middle school educators about working with children with special needs, without a doubt a collaborative effort between the specialists in the school/district that is, special education teachers, ELL specialists in the school and the general educator, has helped all teachers involved; with on-the-job training in creating materials that lead to successful achievement of their students.

*7.1 Collaborating with Media Specialists*

Formerly called a librarian, the school media specialist is an integral part of the UDL/differentiated instruction/technology triune system. Media specialists also may be disguised as technology gurus but, regardless of title, such specialists can serve the function of an identifier, retriever and teacher of web-based classroom material. Media specialists in schools have knowledge of and access to web-based material as well as how information is retrieved and used by teachers. Many 21st-century school librarians have reinvented themselves to meet the demands of the digital age by continuing to cooperate, share, and provide service formerly restricted to paper and pencil. Offering a full range of print and electronic resources, many school librarians make sure that information literacy skills, responsibilities and assessments are integrated throughout all curriculum areas to the school's students, parents, teachers, staff and other members of the school community (Rosa & Storey, 2016).

*7.2 Creating An In-house Team*

Returning to materials, we now have an in-house team who can pool their knowledge in terms of what kind of media based material is realistic, available, and targets the objectives of a particular unit. Each member has much to contribute. Content teachers at the middle school level identify and clearly articulate unit objectives. Special educators build upon that objective to provide accommodations for students eligible for special services. ELL instructors bring their own special strategies for assisting students whose primary language is not that of the classroom. Blogs, wikis, media (audio, photo, video, text), sharing tools, networking platforms (including Facebook), and virtual worlds can be used to promote collaboration and information sharing among teachers to reach out to others across the World Wide Web when one or more of the team members is not available or does not exist in their setting.

*7.3 Expanding the Use of Technology*

With so much opportunity provided through technology to organize, integrate and differentiate instruction utilizing a UDL model, then why aren't more middle school teachers taking advantage of such a model to increase student engagement and foster learning for at-risk students? Of course external obstacles, which are unique to settings, such as district policies, availability and access, are obstructions to integration of technology, but the most critical barriers are intrinsic, that is, attitudes, beliefs, knowledge and skills. In general, research suggests that teachers are more apt to use technology commonly for communication and low-level tasks, such as word processing, drill-and-practice activities, and exploring websites, many of which don't align sufficient with higher order learning goals which are learner-centered (An & Reigeluth, 2011; Bakia, Means, Gallagher, Chen, & Jones, 2009). Even with the student-to-computer ratio increase over the last 10 years, many teachers are not integrating computers or technology into instruction regularly or taking advantage of technology's potential to foster 21st century skills (Lawless & Pellegrino, 2007). In order to expand the use of technology which promotes higher-order thinking, teachers must reach out to locally, nationally and internationally for professional development from others who are incorporating technology in their classrooms. Teachers must look for other like-minded individuals and shift focus from routine tasks, such as recording grades to discussions with colleagues of how opportunities for student learning with technology has been and can be integrated into instruction (Bakia et al., 2009). When technology is thoroughly integrated with a UDL model coupled with differentiated instruction firmly rooted in Bloom's Taxonomy, instruction will move away from teacher-centric dissemination of content knowledge. In its place, learning will become student-centric, that is, students, with guidance from their teachers, will become actively involved in their own discovery and application of information which is a powerful motivator for learning experiences allowing students to realize their potential as innovators and creators regardless of categorical label (Alliance for Excellent Education, 2012).

**8. Summary**

In this paper, the authors presented a framework that combines the three interdependent components of learning: differentiated instruction, Bloom's Taxonomy, and UDL. Suggestions are included for teachers' capacity building to integrate technology to accommodate diverse student learning needs and styles. The increasing number of students with learning and behavioral issues, e.g., autism or attention deficit disorders, demands that instructional strategies take into account characteristics of the middle school learners to promote student success in the classroom. A technology-based environment allows for multiple formats which can provide alternative instructional options in which students can engage in lower to higher order activities accounting for atypical learning approaches and reducing face to face situations which can be intimidating.

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