



## INCLUSIVE EDUCATION IN THE 21<sup>ST</sup> CENTURY CLASSROOM – DIFFERENTIATING WITH TECHNOLOGY

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Educational institutions spend tremendous time in creating and implementing foundations of inclusive programs for students with disabilities. Careful thought goes into the programming and setting up of co-taught classes, generating balanced classroom schedules and training co-teaching partners, developing joint and cooperative relationships, and providing suitable provisions for students with disabilities. Nevertheless, even with well-thought-out and programmed inclusive services, the general education teachers and co-teaching teams frequently struggle, with how to successfully teach students with disabilities in general education schoolrooms.

### **Diversity in Classrooms**

The diversity of the 21st-century classroom creates plentiful challenges and trials for teachers who may have themselves not known the same diversity as students. Amongst these, educators must balance the necessities of high-stakes responsibilities while meeting the requirements of different learners within their classroom. The frequency of special education students in the classroom, however, is only one of the obstacles that teachers face. Educators must also contend with an increasing number of students from culturally and linguistically diverse backgrounds and from high-poverty families.

As student requirements become more diverse and curriculum becomes gradually more difficult, teachers are finding it extremely perplexing to meet students where they are and to bring them to where they need to be educationally. Therefore, teachers of today are required to meet all of their student's learning needs by incorporating technology in the classroom. It can serve as a strategic tool for differentiating to meet students growing and changing academic needs.

### **Differentiating Instructions**

The practice of differentiating teaching benefits teachers to address arduous criterions while countering the individual needs of students. Differentiation permits teachers to concentrate on necessary services in respective content areas, be receptive to personal variances, integrate assessment into instruction, and provide students with numerous boulevards to learning and education. The outcome is a classroom where specialized teaching is the norm for every student. Learners with disabilities have access to suitable variations and adjustments, while students who excel have access to appropriate tasks and challenges. This model for instructional planning and delivery is not a new idea and is widely touted as the most promising solution to many of the obstacles presented by the proliferation of diverse learning styles of the students.

### **Implementing Differentiated Instruction - Use of Technology**

Various studies have explored teachers' perspectives on making adaptations for students with disabilities in inclusive settings. Their findings indicate that teachers largely do not feel prepared to address students' diverse needs. Furthermore, teachers feel pressurized by the necessity to cover a wide range of content in short time, excessive classroom management needs of the classroom and lack of time to prepare lessons. In addition to these difficulties, teachers report problem of dwindling means in their classrooms.

Many of the impediments in executing differentiated instruction can be overcome with the effective usage of technology. For example, now the educators who feel less prepared to counter the varied needs of their learners, have immediate availability of further alternatives than ever before as a result of the wide array of available software and hardware tools. Technology can prepare teachers to address students' needs in an almost unlimited number of ways, through content input, learning activities, and prospects to exhibit intellectual capacity. Since a lot of students come to the academic settings with a tendency for using it effortlessly, technology can become a conciliator that bonds the association between teacher and learner, permitting the teacher to meet student in an acquainted domain.

Technology also addresses the requisite to cover a comprehensive collection of content in a short time by curtailing the need to take the core curriculum at a relaxed pace. The special need students may benefit from technologies that supports them and allows them to keep pace with their peers. For instance, a learner with dyslexia who might typically struggle while reading a passage could benefit from reading the text while listening to an audio recording through headphones. While introducing new concepts, teachers lessen the need for review and remediation after the initial instruction by providing audio, visual, or concept-mapping supports.



The pressures of classroom management needs can also be alleviated as a result of using technology to differentiate instruction. Classrooms enriched by technology provide scaffolding and structure to students who need support and enrichment that thrive on challenge. The outcome is a learning atmosphere that is task oriented and foreseeable where students comprehend what is anticipated of them and how to be successful - a classroom where there are gifted learners, learners with learning disabilities, and learners with other special needs and they all are challenged at appropriate levels and at the same time. Here students are more likely to be involved in learning activities and less likely to be engaged in incorrect behaviours. In such environments, classroom management works differently. Teachers act more as facilitators, which allows for more individual attention to students who need it and as a result might otherwise behave inappropriately.

The hurdles presented by restricted financial means need not deter the educators from differentiating with technology. There are many tools and practices that assist differentiation that can make use of free software and programs, and also the basic technologies found in nearly every classroom.

The difficulty presented by dearth of time to prepare lessons is possibly most challenging to overcome when realizing differentiated instruction, even with the help of technology. Learning to effectively differentiate instruction does take time, fluency comes with experience just like with any instructional practices. Nevertheless, in the beginning investment of time to develop skill with a new approach can counterbalance time that might else be spent re-teaching text that learners were unsuccessful to learn as a consequence of a non-differentiated approach. Teachers who seek out to differentiate but are mired by lack of time may find success in concentrating on just one approach at a time, progressively developing fluency with differentiation practices.

### Technology Integration

Prior to exploring a particular technology that can provide backing to a teacher's differentiation practice, it is imperative to deliberate how to successfully incorporate technology into teaching. The leading principle of technology assimilation is that the emphasis should be on the end result of the instruction, and not on the technology itself. When technology is employed just for the sake of performing something innovative and diverse, teachers fail to connect the availability of technology to support the prerequisites of the learning situation.

Preceding the decision for the usage of a specific technology for a specific lesson, teachers should first mark the points about the learning goals, activities, and assessments that will outline the learning experience. Through the process of making these decisions, instructors can more easily visualize prospects to incorporate one or more technologies.

### Instructional Decisions: Basis of Planning a Learning Event

The basic instructional decisions that form the basis of planning a learning event are -

1. Selection of learning goals.
2. Creating real-world pedagogical decisions around the nature of the learning experience.
3. Selection and sequence of categories of activity to formulate the learning experience.
4. Selection of formative and summative assessment strategies that provide information of the student progress.

### Dimensions in Differentiation

Differentiated instruction involves two major dimensions —

1. The teacher-dependent dimension, and
2. The student-dependent dimension.

Both the dimensions consist of its own set of variables:

Teacher-dependent dimension -

- Differentiation through content
- Differentiation through process
- Differentiation through product
- Differentiation through environment

Student-dependent dimension -

- Differentiation according to student readiness
- Differentiation according to student interest
- Differentiation according to student learning profile

Differentiating instruction includes operating the teacher-dependent dimensions — those variables over which teachers have control. But differentiating instruction effectively requires manipulating those variables with attention to the student-dependent



dimension — the variables over which teachers have no control, but that make each student unique with their respective learning styles.

The power and use of technology lie in the teacher’s skill to use it for customizing and adapting instruction. Its benefits teachers to address student variables by handling the complexity or level of difficulty of the content, the methods by which students receive and absorb that content, their options in signifying what they have learned, and the situations under which they do so.

**Student-Dependent Dimension: Understanding Learners’ Needs**

Although teachers cannot control the variables that make up the student-dependent dimension of differentiation i.e. students’ readiness, interests, and learning profiles but they can learn to differentiate instruction effectively as a result of understanding those variables. Knowledge of the contents of student’s Individualized Education Plan (IEP) is significant, but often does not provide enough information to create a differentiated classroom. Student’s learning inventory, an example of a diagnostic assessment, provides solution for managing this primary obstacle. With the aid of technology, a teacher can create, host, and administer a learning inventory, and then easily analyse the results — all without students feeling of being put on the spot.

**Teacher-Dependent Dimension: The Four Variables**

The teacher who develops a basic understanding of their students’ readiness, interest, and learning profile is ready to use that information to adapt the instruction based on the four variables of teacher-dependent differentiation: content, process, product and environment.

As instruction continues, the teacher can return to these student-centred formative assessment techniques to adjust and enhance the understanding of the students’ needs.

**Differentiating Through Content**

Differentiating by content happens in a number of ways, but the two principal means include-

1. Using different content to teach the same subject to students with different learning styles, and
- 2.Improving or augmenting existing content to make it accessible to all students.

Technology can expedite both the strategies viz.finding new content and enhancing existing content.

**Finding Content**

The usage of worldwide web to collect information is now so pervasive that it is unimaginable to think how we previously lived without it.It was not very long back that teachers and textbooks provided the solitary sources of content for students in the classroom. Now the collection of material accessible to students is almost unlimited, and includes research-based articles by university professors, digitized books, manipulative images, archived radio programs, scientific videos, and much more.

Most teachers already understand how to find relevant content for students on the internet but how to find content that supports the learning goals for a lesson while meeting students’ individual learning needs is often not obvious. Both the formative and summative assessment strategies are necessary to gain feedback on whether a certain type of content is successful with a particular student. There are certain simple concepts that provide useful starting point.

**Students with ADHD**

Learners having problem in attending to lecture or while reading lengthy texts benefit a lot when verbal and textual input are augmented with visual reinforcement by video or images. A number of video-streaming subscription sites like the Discovery Education Streaming offer genuine content created with keeping the learner in mind. These online video databases can be easily found and offer an array of topics and cover different levels.

**English Language Learners**

Learners who do not have English as their first language can become exasperated when offered with information that meets their English comprehension level but is far lower than their cognitive level. These students highly benefit from complementing verbal and written information with videos. Discovery Education videos comprise of closed-captioning, which highlights the language by providing spoken and written speech simultaneously, while supporting vocabulary acquirement with images.

**Students with Reading or Processing Difficulties**

Learners who struggle in reading or processing text likewise benefit from visual reinforcement for a reading passage. Augmenting a reading passage with pictures provides valued context that can support the learner’s understanding and comprehension. Prior to sharing a selected reading with the students, the educator can categorize the elements of the passage that provide for visual



enhancement and create a list of images to improve comprehension. As a pre reading strategy the Image databases like Flickr and the Wikimedia Commons provide easy, searchable access to countless images, which can be displayed in slideshow format for the entire class. Consecutively, images can be inserted into a multimedia presentation to be viewed individually alongside a text while the student reads. When the text is accessible electronically, it may be possible to insert both the text and the associated image in the presentation.

### **Augmenting Content**

Same as technology offers an approach to bring diverse content to students, it also provides a way to make the same content handy to students for whom, might not be otherwise possible. A reading material that may not suffice the needs of every learner in a classroom can easily be made accessible with the aid of technology. As agreed by all, differentiation practices first begin by considering the needs of the learner and then let the technology follow.

### **Screen-Reading Software**

If the teacher selects a text that is web-based, then as a starting point to support students who have trouble with reading is to use screen-reading software. This type of software provides assistance to students with learning disabilities by reading aloud text from a web page or document using a created voice. In some cases, the software highpoints the words as they are being read, allowing learners to follow along as they hear the text. For English language learners, this strategy is very useful. At the same time it is also important to ensure that the quality of the audio input provided is understandable to the listener. Screen readers have faced severe criticism because the artificial voice may not provide the fluency and genuineness needed by concerned students. Recently, these voices have become more natural and human-like. Many screen-readers offer free trial and further, more simple programs are available for free.

### **Concept Mapping**

Occasionally the challenge presented by the text is one of comprehending and remembering relationships. The ability to understand these relations can exasperate the student thereby interfering with comprehension of the text. In a narrative passage that Centre son character interaction, students with processing difficulties may have trouble retaining the relationship between key characters. In social studies classes, the difficulty can be of acquiring how crucial events relate to a historical construct. In an English language arts classroom, the task might be to understand and remember the organizational structure of a research paper.

The concept maps help students in comprehending by recognising key concepts and thus making noticeable the relationships between them. These visual illustrations permit students to read similar passage as their peers without the frustration caused by the inability to synthesize information. The teachers can construct concept maps as pre-reading strategy and provide to the students having processing issues or dyslexia prior to reading a text. The teacher can use this to preview the passage with the whole class or individually, depending on the level of the students. The learners can also create their own individual concept maps after completing a reading. Used as a post-reading activity, concept maps help learners to closely evaluate what they have read and can serve as formative assessment.

### **Digital Textbooks, e-books, and Audiobooks**

There are a variety of Digital textbooks - both online and CD-based that offer options for accessing the same content at different levels of complexity. The digital format provides advantage over traditional textbooks because the digital publications can integrate time-based and interactive media straight within the text.

Nowadays, the text book publishers provide CD-based digital textbooks that offer a variety of features, including pronunciation guides, text-to-speech, and vocabulary support, as well as features that allow the student to alter the formatting of the text to develop and improve the readability.

Several digital textbooks permit students to listen to the text. This feature supports students with learning disabilities as they benefit from the ability to hear and view the text simultaneously.

### **Microsoft Word**

One of the easiest differentiation tools for a reading passage is a software program that most teachers have readily at hand — Microsoft Word. The selected reading passages that are smaller, copied and pasted into Microsoft Word, can be easily improved to aid comprehension and understanding using standard formatting features within the program. The teacher can make use of highlighting feature that help students focus on particular aspects of a text like parts of speech, literary devices, or key elements of a paragraph or research paper. They can also use the comment feature to make available framework or context for a student who needs assistance with a reading passage. Comments allow a user to insert a call-out box elaborating on a difficult vocabulary word, idiomatic expression, or complicated idea.



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### **Differentiating by Process**

As with differentiation by content, using technology to differentiate by process requires first attending to the student-dependent dimension of differentiation. Focusing on student readiness, student interest and student learning profile yields effective differentiation centred on learners' needs.

### **Flexible Grouping**

An approach to attend to those student-dependent variables is to implement flexible grouping. In flexible grouping, students are organized in groups according to one of the three variables — ability/readiness grouping, interest grouping, or grouping by learning profile. The strategy is termed “flexible” because students may be grouped differently according to the activity or learning objective, and because students can move from one group to another.

The teacher can prepare the initial learning inventory of the group by going through the learning profile of the students like identifying students who have similar preferences e.g. students who do their learning by writing, learning by deliberating, or learning by constructing some material. Making group of students according to the capability or readiness of the students and organize them according to their background knowledge and understanding of the subject or their ability to carry on through the information at a certain pace.

### **Processing and Recording Information**

Technology can be utilized to sustain each student to do their work to integrate new information, either single-handedly or in flexible groups. A student with a learning disability like dysgraphia may feel frustrated that they cannot easily take notes or render responses to assigned questions because of the difficulty with writing. Use of laptop or a portable word processor can lessen that frustration and freeing the student to extract notes or answers by using keyboard.

Technology can similarly support students who are diagnosed with dyscalculia, a learning disability related to mathematics. The use of hand-held calculator can help students who have difficulty writing numbers in proper sequence. Students who are unable to access handheld devices, there are many online calculators who offer the same functions. Alternatively, students with dyscalculia can use spreadsheet programs like Microsoft Excel, which have built-in formatting options to help students organize and see data. The ability to colour-code columns or rows of data, for example, can help a student who needs support to distinguish numbers.

Furthermore, Microsoft Word offers free Mathematics Add-in that can be used to generate graphs and solve equations within the word processor. The add-in allows the students to select mathematical symbols from a set of specialized menu and insert them on the page. This level of backing makes a difference when students are faced with a blank page and are not certain from where to begin. The accessibility of mathematical symbols as options from a menu generates a more reasonable situation for these students.

### **Manipulating Information**

For students with processing difficulties or kinesthetic learners, virtual manipulative can be another powerful way to learn math. Virtual calculation constructs a conceptual understanding of mathematical theories beyond just the formulaic models of traditional mathematical coursework.

### **Augmenting Learning Time**

Other than the classroom, students with learning disabilities benefit from opportunities and prospects to access online tools and tutorials that improve their assimilation of new information. Extending access to class content further than the scheduled teaching period makes an immense difference for students who need extra processing time. The ability to repeatedly review materials like video tutorials, demonstrations, and archived lecture recordings outside of class can aid students' comprehension and provide invaluable access to instructional materials for their tutors or parents.

Various online course platforms like Moodle and Blackboard make available a structure for content, letting teachers to organize materials that are easily accessible to students. Teachers who do not have access to learning management through their schools can create their own class websites using various free tools. Teachers can also use web-based tools and screen-capture packages to construct archived presentations that pool in images, video, and voice-over narration. Certain specific software packages also feature the facility to supplement screen-based annotations in the form of callouts to draw attention to a particular element visible on the screen.

Many of the interactive white boards and associated tables have built-in capture software, which make it possible to construct or reconstruct a class demonstration or tutorial to be watched at a later time. These features help teachers save on time in teaching and planning since the archived presentation, including all the component images, demonstrations, and discussion, can be used immediately for students who need to review the materials.



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### Differentiating by Product

The demonstrations of learning of the students reflect who they are as individuals, who they are as creators and who they are as learners. Differentiating by product means proposing choices for how learners will express their understanding and comprehension of the aim and objectives of target learning. Permitting students to select from numerous alternatives empowers them and intensifies their motivation and engagement. Since numerous studies have shown a positive correlation between student engagement, appropriate academic activities, and high achievement, differentiating by product often translates to improved student achievement.

The wide array of technologies accessible to students to construct and store products is massive and continuously increasing. Various scholars consider these technologies as cognitive tools because they enhance the cognitive powers of human beings during thinking, problem-solving, and learning. The different choices and selections along with the flexibility delivered by these cognitive tools offer support for a range of learning disabilities. Effective selection of technology should also be done with paying attention to students' readiness, interest, and learning profile. For every learning objective and student need, there is an appropriate tool that can play towards students' strengths while engaging and motivating them.

### Writing Platforms

Students who are good with written products, online text platforms like blogs and wikis provide great motivation by offering the promise of an attractive product with a "real" audience. There are certain blogging sites that offer teachers the skill to create a classroom blog linked to specific student blogs. One example is the Landmark Project's Class Blogmeister which is free for teachers and provides a safe environment where students can securely share and give remark on the work of their peers.

Before students publish their written work on an online platform, they should first compose the work using word processing software like Microsoft Word. There are a number of built-in features in the software that can support learners having difficulty with written language and processing for example –

**Spell checker** helpful for students with dysgraphia and various other learning disabilities. Although it is important to acquaint students with the pitfalls of relying on this feature. The autocorrect feature can be enabled or disabled depending on students' strengths and needs.

**Grammar check** helps students identify awkward grammatical constructions like passive sentences.

**Text-to-speech** add-ins help with auditory proofing before pupils submit their study material. Several free text-to-speech add-ins for Microsoft Word are also accessible.

### Demonstrate Understanding through Multimedia

Students who struggle to organize their thoughts and students who have dyslexia are often paralyzed by anxiety when they're assigned written work. When written work is a necessity (and in many cases, it is), appropriate supports should be provided. In certain conditions, the suitable use of multimedia products, either to complement or to substitute written tasks, can be used to free students whose expression is often hampered by their learning disabilities. Free web-based multimedia tools offer learners with choices that respect their individual strong points and weaknesses like-

#### Digital posters

Digital poster displays, incorporate media elements like images, videos, audio recordings, and drawings with text like those created using Glogster EDU. Gifted students and students who thrive on creative freedom find engagement and challenge in such a format and students with learning disabilities find support in the options for expression.

#### VoiceThread

The VoiceThread is an online platform where students can answer back on a topic by using text, audio, video, or images. The multiplicity of options makes it possible for students having learning disabilities to contribute to the presentation using the method that works best for them. The option to record an oral response, rather than delivering it "live" in class, benefits students who need time to compose their thoughts, as well as students who have speech disorders like stuttering.

#### Digital Storytelling

Digital storytelling projects, in which students tell fictional or true stories, are another example of differentiating product by student interest. Every student draws on his or her experience or interest to deliver the content for the product. Digital stories can be produced in a variety of formats, including pure audio, image slideshows with static text, image slideshows with voiceovers, and pure video. The options that prioritize audio over text benefit students who have difficulty with writing.



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Free, downloadable audio-editing software like Audacity can be used to create and edit digital stories. Learners who require assistance in mapping out the characters, setting, events, and sequence of their stories can make use of concept mapping software to consolidate their point of view.

### **Evaluate Student Products**

Every student requires the support of clear project guidelines in order to succeed. Students with special needs may need additional support to stay on task and complete each step in finishing a project. Creating separate rubrics for students who have different learning skill sets can provide the appropriate level of support for such students.

### **Differentiating by Environment**

The significance of the fourth element of teacher-dependent differentiation i.e. manipulating the environment to support all learners has been recognised in several studies. The environment refers to the physical space where learning takes place and all the elements within that space that have an impact on student learning. While it is important to know students' backgrounds and needs in order to effectively teach them, we must also attend to how students learn best and how environmental factors impact their ability to learn optimally.

Understandably, certain elements of the environment cannot be influenced. Classrooms that have desks fastened to the floor or the room temperature is controlled at another place, teachers face limitations on how much of the environment they can influence. But even in the realm of the class atmosphere, technology can support differentiation.

### **Controlled Chaos**

Differentiated classrooms are not quiet places of learning. Students move around the room as they work together with their classmates. Table discussions occur on a regular basis. Students listen and create audio recordings and text-to-speech devices making reading passages available to all students. While this may sound like a symphony of learning to the instructor but a student with processing issues might find it as an overwhelming harsh noise.

Just as technology amplifies the learning sounds of a classroom, similarly, it also offers solutions to keep that noise in control. The headset of individual students is a crucial component of a differentiated classroom. It allows students to easily access audio and video any time without disturbing their peers. Operational differentiation by location demands careful planning so that certain students can work self-reliantly using headsets while others can work in groups. The sound of students working in groups does not disturb students who are using headsets to access audio content, and vice-versa.

In schools that have adopted one-to-one initiatives, in which each student has access to a laptop, students have their own "differentiation in a box." Although each student has the same tool but it can be manipulated to serve individual needs. The one-to-one setting streamlines other facets of differentiation, since students have ready access to differentiated content, tools for differentiated learning processes, and resources for creating differentiated products. Those educators who do not have the facility of a one-to-one setting with the students can use the same principles of differentiation, but need to plan more carefully to hand out resources fairly and make operative use of the school's media centre.

### **Sensory Experience**

Occasionally, the standard tools used for both teaching and learning are unable to meet the needs of students who are influenced by environmental factors that are beyond anyone's control. For example, some students have sensory dislike or motor skills problems associated with using simple common classroom tools like pen and paper. Though these learners are perfectly capable of completing the assignment and may even be recognized as gifted but the physical sensation and auditory impact of putting pen to paper hinders with their ability to take part in classroom activities. Such students find using computer enables them to exhibit their learning while navigating around unpleasant and challenging sensory experiences.

### **Ethnically Inclusive Classrooms**

Environmental differentiation also comprises of making the environment favourable to learning for students from diverse cultures and backgrounds. A socially inclusive classroom setting comprises ready access to materials that provide a rich and global outlook on the world and permits each person to feel valued and respected as a result of his or her background. The educators can also use technology-aided communication like class websites or wikis to learn from students about their cultures. The ability to incorporate students' cultures and experiences into the classroom corroborates who they are as learners.

### **Conclusion**

Undoubtedly, successfully differentiating instruction presents challenges to even the most proficient educator. Although technology cannot completely remove every impediment, it can make differentiation easier for teachers and more appealing to

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students. Those educators who spend time and effort to assimilate technology into their differentiation practice can reap huge benefits in classroom organization and management, student engagement, and the pacing of lessons.

Successful technology integration, however, relies on intelligent planning. The teachers must realize those variables that are not under their control like students' readiness, interest, and learning profile. Planning should first start by recognizing those variables and understanding the learning goals. As a natural aftermath, the selection of technology follows as teachers select suitable tools for manipulating those variables that they can control i.e., content, process, product, and environment. Differentiated instruction aimed with these ideologies in mind warrants classrooms that are rich centres of learning for all students.

## References

- [https://education.wm.edu/centers/ttac/resources/articles/inclusion/effective teach](https://education.wm.edu/centers/ttac/resources/articles/inclusion/effective%20teach)
- <https://infosavvy21.com/tag/differentiation>
- <https://educationict.wordpress.com>
- <https://haotransnhu.wordpress.com/2017/03/14/journal-2-so-whats-next>
- [https://prezi.com/sswbekv\\_bfe-/why-prezi-can-help-to-differentiate-your-classroom](https://prezi.com/sswbekv_bfe-/why-prezi-can-help-to-differentiate-your-classroom)
- <https://sites.google.com/site/ticsportfolio2013/>
- [https://www.academia.edu/37186769/Inclusion\\_in\\_the\\_21st\\_/](https://www.academia.edu/37186769/Inclusion_in_the_21st_/)
- [randilembke.wordpress.com>2012/04/21>amp](https://randilembke.wordpress.com/2012/04/21/)