Catering for the diversity of students in the 21st century classrooms

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Abstract.
The article considers Universal Design for Learning as a comprehensive approach for catering the diversity of students in modern classrooms. The key concepts of the work are the actual concepts of the modern educational environment such as educational barriers and accessibility. Multiple means of representation, multiple means of action and expression as well as multiple means of engagement described in the given article allow educators to create classrooms with updated content providing the student-centered design.

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multiple means of engagement
learner-centered design
The growing diversity of classrooms in the 21st century encourages educators to make decisions in favor of students taking into account their individual traits, abilities and needs. All the students are unique and special; thus, it is the classrooms and teaching practices that should be changed. Learning should have no limits irrespective of its venue for such learning to take place. Our vision is to provide engaging opportunities for every learner to access learning environments designed with learners’ needs in mind. The effective practices to identify, engage, and teach diverse students should be in place to prepare such individuals to shape the workforce of the future. The up-to-date educational environment is designed to ensure the transition from a system of mass education to life-long individualized learning focused on the formation of a creative and socially responsible individual. Highlighting the learning needs of students with different abilities serves as a basis to determine the approaches to teach a variety of students as well as to select the didactic materials and other teaching tools [1]. The current education system has the opportunity to choose the exact and appropriate resources to meet the needs of every student. The main purpose for the new educational environment is to reduce numerous barriers and ensure equal access to learning resources.

The educational barriers and accessibility issues are of extreme significance these days. Just as there are no two identical people, there are no similar ways of acquiring knowledge. Considering educational barriers and accessibility issues in the framework of Universal Design of Learning (UDL), it is worth underlining that UDL is an effective approach to improve teaching expertise. The methods of processing, retaining and representing knowledge are individual features of everyone’s system thinking. The rate of assimilation of knowledge, memory, and the tendency to express thoughts verbally or in writing are also purely individual qualities of mental activity. The quality of students’ knowledge not only in a particular discipline, but also the amount of knowledge acquired during the entire course of study depends on the successful solution of the issues of educational barriers and accessibility.
Accessibility is the main term used to describe the degree a particular educational material is available for permanent use by all students. To create an accessible learning environment, educators must be aware of the barriers that affect students’ learning, so they should eliminate the barriers that are within their control. UDL changes the concept of study programs by focusing on the diversity of students and designing more flexible study programs. Accordingly, the constant work aimed at eliminating educational barriers and expanding accessibility is the most important task. The modern global educational community understands diversity and variability of students not as a barrier, but as an opportunity to enrich teaching. UDL provides multiple ways to create classrooms where the learning process is appropriate, inclusive, empowering and accessible to all the students.

Therefore, we need certain approaches catering for the diversity of students in the 21st century classrooms to organize the educational process itself in the compliance with the principles of Universal Design. Applying the principles of UDL allows to create conditions for students with special educational needs as it provides the necessary constant support in the process of mastering the curriculum not only in separate classrooms, but also in every lesson through following a flexible curriculum.

Looking back at the history of UDL, one can see that the main principle was the rejection of averaging. The term «Universal Design» (UD) was proposed by the American architect Ronald L.Mace (1985), as a definition of approaches to products and environment design from the standpoint of aesthetics and accessibility for any person regardless of age, physical abilities or social status. Ronald L.Mace claims that «Universal Design is a concept whose time has arrived. It is also on the cutting edge of progressive design, and offers designers the chance to challenge conventional design thinking by designing products, buildings, and facilities which incorporate new ideas, and embody the essence of good design: that which is practical and can be used by all» [2]. The initial focus on UD is more cost-effective than making changes to the finished product or service. Easy-to-use,
accessible products and services improve the quality of life of all the citizens. In contrast, things created for «an average user» are not optimal for the vast majority since none of us is average, just as study programs aimed at «an average student» have not found their addressee.

In the early 1990s, the specialists of the Center for Applied Special Technology (CAST) in the USA drew attention to the fact that the concept of Mace’s universal design is applicable to the field of education. Using elements of flexibility, inclusiveness and foresight of people’s needs, combined with advanced scientific achievements, CAST specialists have created the concept and technology of UDL encouraging teachers to look for universal tools for students with different abilities.

Unlike UD of products and services, UDL in education is not limited to physical comfort but covers the areas of cognitive, motivational and emotional accessibility: the one consistent feature of learning is variability – all students learn differently and take different paths to success [3]. UDL in the educational approach provides representation of information perceived by all students, reduces the need for physical effort to access it, provides motivation and involvement. Using the principles of UDL helps to choose teaching materials and strategies to organize and manage classrooms taking into account the personal traits of different students. Even a good design and structure of the educational program by itself does not guarantee the effective teaching. Teaching strategies are effective only when an educator uses them correctly.

When preparing a lesson plan by applying the principles of UDL, the main objective should be to provide students with the opportunity to choose alternative types of action and expression, representation of information, pace of work options and different levels of support. The studies show that different parts of human brain play their own specific role in the processing of information, its memorization, subsequent extraction and use in various activities. To help teachers design flexible learning in their classrooms that cater for the needs of all students, there are three basic principles of UDL (Refer to the Table 1 below).
Table 1  

<table>
<thead>
<tr>
<th>Multiple Means of Representation</th>
<th>Multiple Means of Action and Expression</th>
<th>Multiple Means of Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Provide options for perception.</td>
<td>1. Provide options for physical action.</td>
<td>1. Provide options for recruiting interest.</td>
</tr>
<tr>
<td>2. Provide options for language, mathematical expressions, and symbols.</td>
<td>2. Provide options for expression and communication.</td>
<td>2. Provide options for sustaining effort and persistence.</td>
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</table>

(Adapted from: https://www.theudlproject.com/udl-tools---all-grades.html) [4].

To understand how these principles work in the real classroom, the principles are studied in detail below:

1. **Multiple Means of Representation**

Multiple means of representation of learning material are to provide various ways of obtaining information and knowledge. Students differ in how they perceive and understand the information that is presented, classify facts that they see, hear and read. To perceive a new piece of information, it is necessary to identify and master it using available analyzers. To reduce obstacles, it is required to ensure the perception of information by all students through various modalities (vision, hearing, tactile examination).

It is advisable to provide formats that will allow students to customize them for themselves. For example, texts can be enlarged, duplicated by drawings, pictograms as well as sounds can be amplified. Examples of formats for conveying information can be as the following:

- print,
- large print,
- accessible digital texts,
- closed-captioned and audio described video prepared in advance,
- audio with transcript including in the native languages.
of students,
- Braille texts.

Images, graphics, animation, video series are also the multiple ways of representing information, so they are considered the most optimal. It should be born in mind that the visual representation is not equally accessible by all students. Any potential barriers can be overcome by written and verbal descriptions of all images, graphs, videos, animations in audio prompts of key concepts, physical objects and spatial models to demonstrate perspective or interaction. It is necessary to provide an opportunity to clarify the meanings of words and symbols and the connections conveyed by complex syntactic constructions using symbolic representation options: illustrations, diagrams, tables, models, videos, drawings, presentations, photographs, etc. By playing happy or sad music, displaying different emotionally moving photographs, or giving different kinds of feedback to participants during the classroom, an educator can manipulate participants’ affective responses. This proves the variability of affective states in response to constantly changing surroundings and social interactions as «classrooms are rife with changing conditions that influence students’ affective states» [5].

In order to provide options for understanding, it is necessary to activate schemata or provide basic knowledge. The barriers due to the lack of residual knowledge or inability to recover it when solving new educational tasks can be reduced if background knowledge activation options are provided and linked to the necessary information and sources given. Knowledge transformation requires logical operations, strategies and information processing skills. This proves the variability of affective states in response to constantly changing surroundings and social interactions as «classrooms are rife with changing conditions that influence students’ affective states» [5].

In order to provide options for understanding, it is necessary to activate schemata or provide basic knowledge. The barriers due to the lack of residual knowledge or inability to recover it when solving new educational tasks can be reduced if background knowledge activation options are provided and linked to the necessary information and sources given. Knowledge transformation requires logical operations, strategies and information processing skills. These cognitive and metacognitive strategies include the selection and processing of information, its generalization, classification, prioritization, contextualization and memorization. Well-designed assistive teaching materials can provide built-in supports and algorithms to help students use these strategies effectively. All students should be able to generalize what they have learned and include it in the new contexts.

2. Multiple Means of Action and Expression
The UDL principle «Multiple means of action and
expression» underscores the importance of providing learners with a range of options to make meaning of content and to express what they know and can do. This concept is critical to assessing learners’ content knowledge through a growth mindset and to facilitating learners' sense of ownership and confidence in their learning. The principle can be realized by providing learners embedded instruction, multimedia options for video, picture, and text input or creating editable presentations from completed guides. Providing multiple ways of action and expression includes solving educational tasks, planning, completing tasks, self-monitoring, self-correction, self-assessment and evaluation of the achieved results. As a means of support, it is necessary to provide action and communication options. Learners should be provided with guidance and goal-setting algorithms as well as the materials that provide support at the stages of planning and strategy development using the new information and resources. It is also necessary to provide different options for monitoring progress, ensuring success situations and self-assessment activities formation. Action and expression of acquired knowledge and skills should be provided with the widest possible arsenal of forms and means. Creating drawings, collages, videos, drawings or diagrams, writing an essay or working on a project – a student should be able to choose.

3. Multiple Means of Engagement

Multiple means of engagement imply different forms of how students can be involved and motivated to learn. Developing emotions is an important element of learning depending on personal traits, cultural traditions, subjective experience, background knowledge and a number of other factors. Some students are attracted by novelty, others may be intimidated by it, preferring a strict routine. To reduce the level of anxiety about the new knowledge perception, it is necessary to provide graphs, calendars, timers, various types of signals, etc. They will be able to increase the predictability of daily classroom actions. Some students like to work independently, others prefer to work in a group with their peers or/and know that they can get adult help. We believe that there is no single interaction tool that is the optimal
for all students in all contexts, so it is important to provide several engagement options. For example, suggesting some experimental work or a case-study activity while a student can choose the most interesting to him or her provides active participation as well as the formation of cognitive interests and motivation. We consider the development of individual self-regulation skills as one of the major teaching goals. In the classroom, the best benefit of UDL is that it helps teachers to build in accessibility for all learners right from the start [6]. The educator should create a favorable climate, provide a safe learning environment reducing potential threats, including psychological ones: fear of punishment, mistakes or/and unexpectedness. At the same time, the classroom should not contain distracting elements, excessive sensory stimulations, either the chaotic students’ attention switching. It is necessary to ensure the possibility of changing the pace of work, providing breaks, alternating types of activities and working locations. Providing feedback should encourage learners as a teaching process is not the activity for the sake of its own.

In conclusion, it should be noted that UDL has a wide range of tools and they are selected in accordance with the needs of each student. Furthermore, the use of universal design strategies for teaching will help to understand and move forward on the path of creating conditions that ensure the disclosure of the potential of students with diverse individual needs. Based on the above, we can conclude that flexibility is a key to accessible educational environment and for its part, UDL is a framework catering for the diversity of students in the 21st century classrooms and building the foundation for rearing expert learners. This framework is an approach to drive ongoing learning environment using a learner-centered design. Moreover, implementing multiple means of engagement, representation, action and expression meets the needs of all the students, including learners with disabilities, second language learners, and other underserved populations (disadvantaged population). The mixed-methods instruction utilizes quantitative and qualitative methods to construct lesson plans within the accessibility. This way the UDL guidelines are the
overwhelming framework for the ongoing maintenance of a skilled, talented, and motivated student through a coordinated investment in individual skills development and capacity building in schools, universities, and communities.

**References:**


