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## **Edu4ALL**

### **Disability as diversity: The inclusion of students with disabilities in higher education**

<b>Deliverable D2.6</b>	<b>Defining delivery approaches and assessment</b>
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## 1. Abstract

We are currently living in a world full of opportunities and ideas widening the human mankind's vision through taking advantage of the technological advancement that we reached, also the uprising of these ethical codes that support and empathies each other and do our best to make life easier for all of us. Among the strongest signs of the advancement of any nation is the way they treat their disabled citizen, and the amount of care and support they provide them in order to make all of us grow together and accompany them to fulfil their dreams.

Special mark in this advancement is the ability to make the educational process equal for all participants, which includes all students from different backgrounds and physical situations.

Achieving this status is most vital in the diversity and inclusion in the higher education institutions (HEIs). Which is an opportunity to increase more solid and common ground and argue students to learn and share from each other, in which they are prepared to serve back their societies and show that all the support they have given through their educational journey is well deserved and provide more solid proof that they active and beneficial as any member of their society.

Many resolutions and techniques could help in achieving this status of inclusion in HEIs, for example creating a shared learning space and timetable. – which is considered to be common in many countries (Moriña et al., 2013).

Many other new and updated approaches in the inclusion of students with disabilities (SwD) in the learning and teaching must also be acquired in order to achieve a justice balance between all students, these approaches include the learning, teaching, assessment and curriculum design. These new updates could face many concerns from old fashion institutions about the negative impact on the current teaching methodologies. And this is the most problematic standpoint to ensure an inclusive curriculum, but on the other hand, this will create much beneficial enhancement on the educational experience and participate in the advancement of both classrooms and HEIs.

Making an accommodation in examination generally means that some aspect of the examination or testing condition is to altered so that a student with a disability can more completely show what he or she knows or can do. There are types of

accommodation such as Extra Time, Separate Room, Rest Breaks, Alternative Format Papers, Technology, Recording Answers, Braille & Tactile Diagrams, Amanuensis, Reader, Sign Language Interpreters, Vivas, Other Accommodations such as large desk or table to accommodate equipment, and assistive technology or Braille papers, or others.

In contrast, the reasonable adaptation could have an overseen impact on one of the most feasible challenges that face SwD, which is the transition processes “transition cliff” which face many SwD at the beginning of their academic life in HEIs, as of the fact that not all students have access to the same opportunities and face different barriers that lead to them to questions their very presence in the university and lead to drop out of the university (Wessel et al., 2009).

Noted advancements have been developed over the past years on the terms of inclusion of SwD in the related policy in the Higher education instructions in many countries, also several regulations have been supporting the rights of SwD to inclusion with a dignified curriculum that allows them to learn, prosper, grow and have equal access to the opportunities.

In contrast, the reasonable adaptation does not apply in case the wide version of inclusion is met, this includes the university environments lecture hall, buildings, laboratories, libraries and campus are accessible, which make the base of any intervention needed in the reasonable adaptation. Another achievement in this matter is the issuing of bylaws that regulate the curricular/academic adaptation from teaching staff to ensure drawing attention from the HEIs staff.

In this report, some strategies and general suggestions for reasonable adaptation will be discussed for HEIs and teaching staff, along with curricular adaptation techniques with some other examples of reasonable adaptation for the most common types of SwD. Also, the accommodations in assessment for SwD will be discussed and an introduction about the Universal design for learning (UDL) and UDL-Aligned Strategies will be presented.

## 2. Introduction to Inclusive Curriculum

According to the UNICEF “Inclusion in education refers to a model wherein students with special needs spend most or all of their time with non-special needs students”.

A similar definition can be drawn from the term inclusive curriculum. The ability for being inclusive implicate the way of minimizing barriers that affect the learning process (Morgan et al, 2011).

The benefits of implying an inclusive curriculum on the development and integration process for SwD has a considerable impact either on the educational or behavioral catachrestic on the SwD (Hornby, 2014).

Hornby (2014) defines inclusive education as a “multidimensional concept that includes the celebration and valuing of difference and diversity and consideration of human rights, social justice and equity issues, as well as the social model of disability” (Hornby, 2014).

Ahn & Davis (2020) through their definition of inclusive curriculum focused on what is included in the process itself, mentioned that the inclusive curriculum includes an approach in which plans of education are developed, designed, delivered and evaluated in a way that reduces pointless blockades to SwD, in a matter that will allow all scholars reach their full capacity. Meanwhile, if the curriculum or the means of its delivery to the students is not inclusive, it will prevent SwD from indicating their full capacity and affect their intellectual growth.

The term inclusive education includes complete participation for all participants in the services being provided. A curriculum adapted inclusively acknowledge all students from the different social, cultural, physical background and mental well-being (Morgan et al, 2011).

In short, the focus is on changing mindsets by engaging users in an attempt to change attitudes towards disability (Sutton-Long et al, 2016). This can be likened to the issues faced in higher education that changing attitudes may tackle some of the inclusion issues disabled individuals encounter. Co-design is therefore useful a tool in shaping practice in the disability sector (Sutton-Long et al, 2016).

Briefly, the term itself shed some light on the importance of changing the mindsets of all the stakeholders in the services provided to the SwD during their educational



journey in HEIs by encouraging participants to change their attitudes toward disability (Sutton-Long et al., 2016). Consequently, initiating an adaptation in the curriculum strategy is a valuable implement for determining good practices in the disability field (Sutton-Long et al., 2016).

### 3. Review

Heeding the data shown in different literature reviews and studies regarding the topic of curriculum inclusion, that the process of inclusion faces more barriers than support for reaching a proper inclusion mechanism that supports the SwD (Hopkins, 2011).

Hopkins (2011), also suggest that HEIs curricula have been described by their firmness, not by their inclusivity. Correspondingly, researchers are spotting that the HEIs is not a level playing field in today's university curricula development and inclusion process, and this effect the promises of disabled students' access to short/long term success.

Some other scholars mentioned that the concept of reasonable adaptations to support SwD by HEIs are not common practice, several studies agree that policy is generally reactive rather than proactive (Moriña et al., 2013; Holloway 2001; Hopkins 2011; Moswela & Mukhopadhyay 2011).

Other studies have mentioned substantial blockades affecting the involvement, development and achievement of SwD in the reasonable adaptation process, this includes attitudinal and organizational barriers, or also include resources accessibility (Moswela & Mukhopadhyay, 2011). The fundamental conclusions of the mentioned studies focused on the reasonable adaptation expose barriers in the educational processes.

Likewise, research by Castellana and Sala (2006) settles that laboratory, schoolrooms do not have the required resources needed to ensure SwD inclusion and reasonable adaptation, studies also indicated that teachers usually do not employ effective teaching methodologies to foster full participation for all students. As a result, SwD does not have the chance to enjoy the equivalent chances compared to their peers. With regards to some other mentioned barriers in the reasonable adaptation process was the lack of foresight on the part of teachers regarding adapting course resources

in advance (Moriña et al., 2013). Visually impaired students were among the highest students who were affected by this shortness.

When it comes to the teaching methodologies, the traditional lecture is the most popular and common among other teaching methodologies that the current wide range of universities are using, unfortunately, this approach is unattractive for SwD, who describe it as un motivating and does not encourage participation and interactive learning. (Pozo & Monereo 2006), authors such as Hopkins and Stearns (1996) recommend certain strategies to increase the reasonable adaptation and buildup updated healthy relationships between the students themselves and with the teachers, some of these approaches are collaborative learning, peer tutoring, project-based learning and multi-level learning. Where SwD finds these approaches increases students to become involved, to actively participate in group tasks.

Adams and Brown (2006) pointed out in their book titled “Towards Inclusive Learning in Higher Education Developing Curricula for Disabled Students” that using the assistive technologies in the reasonable adaptation techniques increases the SwD willingness and ability to engage more with the educational process, where many students in his research reported that assistive technologies and technological learning tools are not used as frequent and effective as it should be to meet their needs and increase their motivation.

A recent study by Batty and Reilly (2022), proved that the lack of an inclusive environment affects the educational attainment of SwDs, the study focused on student engagement within the laboratory and on the ways to develop more educational environment programs, and the study concluded that providing an inclusive environment can benefit not just target groups but also all students, also applying effective assessment methodologies to widen the range of belonging among SwDs, besides those major concerns, other issues related to working with others, using equipment and timing were spotted as important factors according to the study.

Finally, designing and delivering a truly inclusive curriculum is essential to meet the needs of SwD; However, previously published papers strongly believe that this shift in classroom practices will ultimately improve learning for all. We never tire of emphasizing that diversity in university courses is a unique opportunity to improve universities themselves; Because of this, we need to push our limits and look for proactive, non-reactive solutions.

## 4. Barriers to an Inclusive Curriculum

A repetitive issue that emerged all through the studies included many barriers that are facing HEIs administration and HEIs teaching staff in applying inclusive curriculum, these barriers include time, know-how, preparation, curriculum design, and the lawful prerequisite to make sensible changes. This shed some light on the preparation process that HEIs should invest in to deploy effective methodologies of the creation of an effective inclusive curriculum. (Moriña et al., 2013; Hopkins, 2011; Hornby, 2014; Wessel et al., 2009)

Taking into account the many changes in countries' legislation and the development of programs for students with disabilities, in recognition of the importance of higher education for individuals, families, and society at large, low enrolment and high first-year dropout have been found. Low enrolment and high dropout can be understood as the result of inadequate accessibility of higher education institutions, lack of support, adverse social attitudes and social isolation, as well as low financial capacity (Svendby, 2020).

Among the supporting factors, studies have shown the importance of faculty's attitudes toward students with disabilities, their awareness of these students' needs, and their knowledge of the reasonable accommodations available. These attitudes influence the success or failure of students with disabilities and affect inclusion in higher education. Negative attitudes of faculty and administrative staff may prevent students, especially students with invisible disabilities, from disclosing their disabilities and from requesting accommodations they are entitled to (ANED, 2009; Lane, 2017; Stapleton & James, 2020)

Regarding academic achievements, studies have shown conflicting results. Some found the average grades among students with disabilities significantly lower, the percentage of course drop-out and failures in courses higher, and the study period (number of semesters) longer, than those of students without disabilities. Students with disabilities reported a subjective feeling that they were failing unlike other students, as well as difficulty in coping with the required investment during the study period, and a sense of social isolation. Other studies, however, found no difference

between students with and without disabilities in average grades. Several studies found average grades of the former higher than those of the latter (Kraska, 2003).

## **5. General suggestions for inclusive curriculum design governed by HEIs**

While inclusive design requires that the HEIs be actively engaged in certifying practical regulations in the right position, in many other cases it is essential that the HEIs be receptive to the most affected target group of their intervention, who are the SwD (Morgan et al, 2011). Occasionally this can mean the creation of modifications to the educational methodologies and the process itself. Furthermore, to ensure contribution and engagement to the varied requirements of all students through the curriculum (Stapleton & James, 2020).

Therefore, comprehensive curriculum design promotes student-centred learning and serves several diverse students. This not only benefits students with disabilities, but also the university's diverse student community (Stapleton & James, 2020). In many cases, a comprehensively designed curriculum saves time and reduces the need for adjustments at a later stage. Morgan et al. (2011) recommend that diversity be an agenda item in the various committee meetings. These discussions can be fruitful between students and staff as this can be incorporated into curriculum design and promote a comprehensive curriculum. This is not only a problem in higher education but an issue that arises in youth services where the priority for services is to develop frameworks around inclusive practices for youth to enhance students' inclusion.

Through different strategies that are available in this intervention from HEIs is creating a proper incentive for the teaching staff to draw their attention about the importance of these adjustments and inclusion methodologies. This could be embedded within the curriculum design process itself, while guaranteeing the HEIs comply with its responsibilities to create a welcoming atmosphere for all stakeholders in the reasonable adaptation process to guarantee that the curriculum is adapted and inclusive for all students, and fulfils the different needs of SwD.

These responsibilities include different actions from the HEIs in order to reach a certain level to ensure that these measures aforementioned are met in the inclusion

curriculum development, some actions that should be taken from the HEIs are the following;

- Ensuring to support the teachers by removing any architectural barriers that the SwD may face in the educational journey, includes providing access to certain laboratories and classrooms that are accessible for SwD.
- Providing a training manual for all teachers to support their endeavour of designing an inclusive curriculum at the start of each semester.
- Provide the teachers with any assistive technologies that they may require through the educational journey.
- The admission department in the HEIs should provide the teachers with a list of SwD who declared their disabilities, this list should be provided to the teachers at the beginning of each semester and involve consideration of students' characteristics.
- Support the teachers with any certain means of support to help in case of certain technologies are required.
- Conduct a workshop at least once per semester between university teachers to share their experience in the process of reasonable adaptation, these workshops could be a great place for university teachers to learn from each other and share their updated techniques and ideas on overcoming any shared architectural barriers within the HEI itself.
- Ensuring that the workload is not a major factor that affects the HEIs staff member on developing proper inclusive adaptation to their curriculum. Unfortunately, the workload in HEIs has been stated as a contributory factor for not adapting the curriculum to serve SwD through their educational journey. (Pivik et al, 2002).
- Important note that HEIs should consider is a clear definition of the disability itself, according to a study by "National Center for Education Statistics" several participants from university staff highlighted that it was easier to identify a disability if it was physical, as opposed to being hidden. Most participants defined disability as someone needing extra support or help. It was apparent that most participants based their definition on the medical model which labels individuals as in need of help. However, this definition excludes a wide range of hidden disabilities that are existed in society, to that matter, each and every

HEIs must have a clear definition of disability and its related branches, according to the regulation that has been set by the authorities.

- Allocate sufficient resources for HEI staff members and teaching staff to support them in the process of developing an inclusive curriculum, the resources may include time, knowledge, training material, assistive technologies, and different laboratory equipment that could be required according to the taught model.
- Increasing the incentive of the HEIs teaching staff members towards the developing of their own reasonable adaptation through including the developing of inclusive curriculum as a worthy section of the annual evaluation report.
- Providing information or guidelines for staff focussing on an inclusive curriculum would be beneficial, this could be accumulated over time, and through the previous experience of the teaching staff.
- Add a section of inclusive education in the hiring test for qualifying new staff member, this will shed some light on the importance of the topic.

## **6. General suggestions for inclusive curriculum design to teaching staff members**

A recent study by Bunbury (2018), draw the point that most of HEIs teaching staff are struggling to accommodate SwD within their classrooms, this was rooted in many causes starting from their lack of time, knowledge, awareness, training for certain situation that faces SwD and the absence of assistive technologies that support the execution of an inclusive curriculum. The study recommends offering practical recommendations to ensure the HEIs include certain practices to ensure an inclusive learning process, which will pave the way towards an inclusive curriculum with the SwD.

The main findings were obviating reasonable adjustments is possible through developing an inclusive curriculum. Also, the HEIs should switch their focus towards the perception of the staff members towards the SwD and maintain a solid understating that the SwD may need to be treated in a different manner that would allow them to feel more inclusive.

But as discussed in our previous point, the load of work is not only on the shoulders of the HEIs administrative staff only, but the big role here is played by the teaching staff themselves.

On the easiest applicable findings through our search, that does not require much external intervention -assistive technologies for example- was creating diversity and flexibility when it comes to conducting an assessment, which is considered one of the heaviest burdens on SwD due to their social and medical situation since they are facing different barriers outside the HEI than the other students. Mapping out the outcome of the educational process through alternative assessment could help SwD to feel included and not being aware of this information in some respects hinders participation, and as a result, excludes the disabled individual from the curriculum.

Some other studies reflected that the attendance policy as part of the assessment criteria could hinder many SwD from feeling included, and this also was reflected due to their medical and social situation.

Throughout the designing process of an inclusive curriculum, many considerations should be met in order to achieve the balance required, the aim of an inclusive curriculum is to provide all participants with equivalent learning opportunities, regardless of their gender, age, cultural background or disability. Some of these principles were mentioned as Universal Design for Learning (UDL) such as:

- **Multiple means of representation**

Through deploying various strategies to deliver the information to the participants through a wide range of techniques, not focusing on one dominant methodology of teaching.

- **Multiple means of action and expression**

Through providing different options in contrast to exhibiting what students have realized

- **Multiple means of engagement**

Adjusting to students' inclinations by offering decisions of methodology, content, tools and values. Also, through motivating students by offering variable degrees of challenge and effective feedback.



## 7. Potential Integration Approaches and Consideration

The importance of higher education in providing students with disabilities with decent employment opportunities and social status is well documented. At a time of legislative endorsement of access to higher education, and changes in attitudes resulting from the struggle for equal rights for people with disabilities, it is crucial to broaden knowledge and understanding of the broad perspective of achievements and experiences of this group of students in higher education and to compare them with those of students without disabilities.

Disability is part of the human condition. To ensure inclusion in higher education, campus leaders (University Admins) must consider how to fully embrace all students, faculty, and staff with and without disabilities. When developing a culture of inclusion, colleges and universities have specific responsibilities to students with disabilities to ensure they can learn and achieve their goals.

### 1. Main consideration is: Creating a culture of inclusion

Disability is a campus-wide concern. Typically, campus leaders turn to the disability support services and counselling offices on campus to build a comprehensive approach to access and accommodations. While those offices have specific and critical responsibilities to support students, becoming an inclusive community takes work at all levels—from senior leadership to faculty and staff, to students. Research indicates that if new students do not experience a sense of belonging within eight weeks of arriving at college, they will be at high risk of dropping out. This is particularly true for first-time students with disabilities, with 25% dropping out by end of year 1 and 35% dropping out by end of year two. Thus, shaping the culture of higher education institutions is one of the most important steps to achieving the goal of disability diversity and inclusion (Shaewitz & Crandall, 2020).

### 2. Define Strategies for full inclusion on campus

Although no higher education institution has achieved full inclusion, many are striving to reach that goal (D. Shaewitz & J.R. Crandall, 2020). Drawing from a recent higher education inclusion guide on how to accommodate students while building a comprehensive culture of inclusion, we highlight specific action steps campus leaders



can take and examples of institutions with support in place for students with disabilities to achieve their highest potential.

1. **Focus on campus design and planning.** What does it mean to create a campus that is welcoming and safe for all students? It includes attention to campus facilities and other physical spaces. The design and accessibility of space communicate values and expectations. Inclusive spaces, or designing for inclusivity, take into account the different ways in which we learn, work, and socialize. This implies that the design considers the sensory world where vision and touch are primary means of spatial awareness and orientation. Primary concepts include sensory reach, space and proximity, mobility and proximity, light and color, and acoustics(D.Shaewitz & J.R. Crandall, 2020).
  
2. **Reflect on how language is used.** How we refer to disability and people with disabilities can be limiting. One way to change detrimental attitudes or stigma toward disability is to intentionally use more inclusive language that dignifies people's images and expectations. Using positive images of students with disabilities from different backgrounds can also help to familiarize disability. Talking about disability and using inclusive language starts with how we define socially constructed concepts such as disability, diversity, and inclusion. Are staff, students, or faculty nervous when talking about disability? Do members of your campus community either behave differently or feel they need to behave differently around students with a disability? How is disability portrayed on your campus or at your institution?  
  
It is important to make awareness about "diversity" to include disability: "Diversity is the range of human differences, including but not limited to race, ethnicity, gender, gender identity, sexual orientation, age, social class, physical ability or attributes, religious or ethical values system, national origin, and political beliefs." Coupled with the definition of inclusion: Inclusion is involvement and empowerment, where the inherent worth and dignity of all people are recognized. An inclusive e.g. university promotes and sustains a sense of belonging; it values and practices respect for the talents, beliefs, backgrounds, and ways of living of its members(D.Shaewitz & J.R. Crandall, 2020).

3. **Build faculty capacity.** Faculty may lack an understanding of inclusive pedagogy, so it is important to talk about disability bias and raise awareness about common disabilities. Faculty are likely to adopt inclusive teaching methods and materials if they are more knowledgeable about disability and understand that students with disabilities have limitations that arise from external barriers and not students' inherent abilities. Students with learning disabilities, for example, do not have a reduced intellectual capacity. Rather they may have processing disabilities that can be addressed by the format, in which information is conveyed, organizational mechanisms such as testing procedures and methods, and other tools. In addition, faculty can initiate conversations with student about supports they may need or encourage them to consider the ways they learn best(D.Shaewitz & J.R. Crandall, 2020).
4. Support the offers with either online or Face-to-face **accessibility training opportunities** for staff and faculty. While these resources are geared toward faculty creating accessible content for online classes, they are relevant for *any* form of instruction that uses multiple mediums (e.g., documents, audio, video). Included should be tutorials, accessibility guidelines, and syllabus templates(D.Shaewitz & J.R. Crandall, 2020).
5. **Ensure technology is accessible.** Institutions should have a clear standard for accessibility when it comes to technology. These guidelines include making captioning a standard element of all videos used in classes and on campus, providing a budget for creating video captions, requiring that all new content posted to a website meet the accessibility standard and establishing accessibility checkpoints before content can be posted(D.Shaewitz & J.R. Crandall, 2020).
6. **Encourage responsibility and accountability.** Leaders at all levels should be engaged in leading, messaging, and measuring improvements in inclusion. All staff should clearly see their own role in, and contribution to, inclusiveness. On-the-ground action among faculty, staff, and students needs to happen in tandem with support at the level of the president, dean, chancellor, or provost who embrace disability diversity consistently and publicly.

7. **Streamline the student accommodation process.** Common reasonable accommodations in higher education include changes to course formats and schedules, examination accommodations, housing changes (e.g., permitting emotional support animals in housing or offering separate housing for people with post-traumatic stress disorder or gender dysphoria), alternative methods of demonstrating or obtaining practical skills, and extra time to complete projects. Part of managing the student journey is ensuring that students and faculty understand the process for learning about, requesting, receiving, and modifying requests for accommodation. Effective, user-friendly solutions for students also create opportunity for the accommodation team, including faculty, to increase their level of service. Institutions need to understand how learning can be impaired by not tending to inclusive practice and accommodation for students with disabilities (D. Shaewitz & J.R. Crandall, 2020).. Are your accommodations designed simply to pass the 'reasonableness' test or does your institutions strive to support learning for all through inclusion? Do you allow for increased flexibility in delivery? Is there variety in how learning is designed and delivered? Does increased interaction with faculty and staff meet the needs of students with disabilities when it needs to?

In summary, an inclusive culture is shaped by the attitudes of administration and faculty through which disability is viewed. Even when students do not experience outright hostility, stigma and generalizations are likely to be the most prevalent barriers in the path of students with disabilities. To counteract common biases against students with disabilities while creating an inclusive campus culture, managers at all levels of the institution must get involved. Inclusion on campus helps everyone to understand the common interests, goals, and aspirations of students with and without disabilities. Students benefit from a diverse, inclusive campus culture, which helps prepare them for the world and active community engagement.

## 8. Use of Assistive Technology in Inclusive Education – Making Room for Diverse Learning Needs

Technology has tremendous capability in supplying access to all learners, and the potential to get admission to public education curricula. Assistive technology is a

standard term that consists of assistive and adaptive devices and rehabilitation for individuals with disabilities and includes without a doubt anything that may be used to catch up on a loss of certain skills' (Edyburn et al., 2005), starting from low-tech gadgets along with crutches or a unique pen grip, to extra advanced gadgets including hearing aids and eyeglasses, to high-tech devices including computer systems with specialized software to assist humans with dyslexia to study (WHO, 2009).

Technical aids or "auxiliary gadget," including information and communication technology (ICT), globally designed technologies, academic technology, emerging and progressive technologies, and available technologies; it could be "any object, piece of device or product gadget used to increase, maintain or enhance the practical abilities of people with a disability, and to assist them overcome or catch up on the disability" (Goddard, 2004) in order to take part in the activities of daily studying. From a simple tool like a magnifying glass to a complicated automated communication system; relying on the character of use and application, assistive technology devices can be used by college students with disabilities on their own or with help, inside and outside of the gaining knowledge of outside sources. Some examples of assistive technology devices are touch controllers, alternative keyboards and mice, text-to-speech software, speech recognition software, phrase prediction software, word processors, grammar checkers, scanners. Drives and spell checkers (Petty, 2005).

Approaches to the usage of assistive technology in inclusive education focus on the use of technology for education or exercising, and to resource and allow studying. A big number of 'at-risk' students are visible as needing assist, however because they often do not input without difficulty right into a diagnostic program, they regularly lack assistance. Assistive technology bridges this gap by way of "helping" the practice of teaching students within the equal lecture room, which includes students with physical, mental, and developmental disabilities (Smith, 2011); helping them learn the educational material in a way that they could apprehend, by casting off the obstacles that had been preventing them from being at the identical degree as their peers. Offering practical tools for application of the principles of cognitive theory to teaching and learning, assistive technology connects a student's cognitive abilities to an educational opportunity that may not be accessible due to a disability (Ahmad, F.K., 2015); this sort of student who has trouble decoding text can make use of a text-to-speech display screen reader as a "bridge" between written textual content and the ability to method information auditory and cognitive; while a student with a difference

within the collection of thoughts within the textual content can use the picture outline application as a bridge for visual processing abilities. For this reason, with the powerful incorporation of assistive technology into the ordinary lecture room, students can provide a couple of way to finish their work, with extra independence in performing duties that they couldn't formerly accomplish or may want to accomplish in an incredible variety; thru suitable upgrades or changing methods of interacting with the technology needed to accomplish such obligations.

Table 01: Use and Application of Assistive Technology in Education  
(Ahmad, 2015)

Characteristic	ASSISTIVE TECHNOLOGY APPLICATIONS	NEED AND RELEVANCE IN CLASSROOM LEARNING
<b>Reading</b>	Electronic books, Book adapted for page turning, Single word scanners, Predictable texts, Tabs, Talking electronic devices/software, Speech Software	For students having difficulty in reading and understanding written text and in paying attention to the reading assigned.
<b>Writing</b>	Pen/Pencil grips, Templates, Word processors, Word card/book/wall, software, Spelling/Grammar checker, Adapted papers	For students having problem in writing or composition
<b>Math</b>	Calculators, Talking Clocks, Enlarged Worksheets, Voice Output Measuring Devices, Scientific Calculators	For students having computational problems and confusions, and finding it difficult to perform well in Math lessons
<b>Vision</b>	Eye glasses, Magnifier, Screen Magnification, Screen Reader, Braille Large Print Books, CCTV, Audio Lesson Tapes	For students who have difficulty in seeing or lack complete vision
<b>Hearing</b>	Hearing Aids, Pen and paper, Signaling Devices, Closed Captioning	For students who have difficulty in hearing or are absolute hearing impaired
<b>Computer Access</b>	Word prediction, Alternative Keyboards, Pointing Option, Switches, Voice recognition software	For students finding it difficult to access the computer in its standard form and have difficulty in performing academic tasks
<b>Augmentative/ Alterna-</b>	Communication Board, Device with speech synthesis for typing, Eye	For students having problems in comprehension of language, and

<b>tive Communication</b>	gaze board/ frame, Voice output device	lacking the ability to express it, or are unclear in speech and demonstrate delayed expressive language
<b>Learning Disability and Attention De_cit Hy-peractivity Disorder (ADHD)</b>	Use of applications/devices depending upon the degree of disability/ difficulty, in the area of reading and writing (Dyslexia), handeye coordination, written expression and composition (Dysgraphia), difficulty in fine motor skills, Coordination (Dyspraxia), Math (Dyscalculia) and Attention (ADHD) like - Talking electronic devices, Calculators, Electric Organizers, Highlighters, Pencil Grips, Post-its, Computers, Spelling/Grammar Checker, Electronic Organizers, Recorded materials, Hand held Scanners, Print or picture schedule, Electronic Diaries etc.	For Students having problem in language development, reading and writing (Dyslexia), hand-eye coordination, written expression and composition (Dysgraphia), di_culty in fine motor skills, Coordination (Dyspraxia), Math (Dyscalculia), and ADHD.

## 8.1 Assistive Technology for Students with Mobility Impairments

Students having limited motor skills may also require a large keyboard at the same time as using a laptop, an on-screen keyboard or speech recognition applications. The usage of an external keyboard in a laptop with connection to a 'mouth- or headstick, where the keys can be pressed with the pointing device can assist college students with mobility impairments; while trackballs, head trackers and contact monitors can function as suitable alternatives to the computer mouse. Utilities can create 'sticky keys' that electronically latch the SHIFT, CTRL, ALT, and other keys to permit sequential keystrokes to enter commands that usually require two or more keys to be pressed simultaneously.

College students with mobility impairments, using a wheelchair, may also have their computer desks adjusted to an appropriate height. Keyboard guards may be used by students with limited motor control, and repositioning the keyboard and screen can also assist in improving accessibility; like mounting keyboards perpendicular to tables or wheelchair trays a convenient-height to assist individuals with restricted mobility to press keys. Left-handed and one-hand keyboards available for students who want to operate the computer with one hand.

For users with severe mobility impairments, keyboard emulation, such as scanning and Morse code input, can be used with unique switches that make use of at the least one muscle over which the individual has voluntary control like - head, finger, knee, or mouth. In scanning input, lights or cursors scan letters, and symbols are displayed on computer monitors and students use adapted switches to select their input. Speech recognition systems permit users to control computer systems by way of speaking phrases and letters. Abbreviation enlargement and phrase prediction software programs can also assist in lowering input demands for generally used text and keyboard instructions, and on-display help might also assist in efficient get right of entry to students' courses for people who are not able to turn pages in books.

Architectural or physical environmental barriers just like the absence of ramps, elevators, automated doorways, are also seen to discourage and restrict the participation of students with disabilities. therefore, infrastructural modifications and modifications in the schools and educational institutions (Campbell, 1989), like the



availability of ramps; accessibility to study room, workspace and labs via lifts; washrooms having counters and sinks with adjustable heights can be ensured and might help address the hidden limitations preventing the equal access and participation of students with mobility impairments in education and social existence. (Ahmad, 2015).

## **8.2 Assistive Technology for Students with Visual Impairment/Blindness**

Visually impaired students struggle to access visual content in print or on a computer screen. Users with visual impairments can use the OBR (Optical Braille Recognition) software to read Braille documents on a typical A4 scanner, scan the page, analyze the dot pattern, translate the text, and present it on the computer screen. Line-by-line translation of screen text into Braille is possible with refreshable Braille displays, which can aid in thorough editing. For visually impaired users, Braille printers provide a "hard copy" output. Optical character recognition scanners can read printed material, which can then be electronically saved on computers, speech synthesis can be used to read the text, or Braille translation software and Braille printers can be used to print it. Such devices enable independent access to blogs, curricula, and worksheets. Screen readers or text-to-speech software, such as JAWS, can be used to read screen text, can assist the user in adjusting the volume, pitch, and speed of reading, as well as choosing or changing to a male or female voice based on their preferences. Users can skip from headline to headline or category to category while reading with screen readers that include navigation options. Using the synthesized voice, the computer can read text passages, assess word phonetics, and attempt to recreate words by stringing together synthetic phonemes, ensuring that the message is easily understood by the pupil. Individuals who use voice output devices can utilize earbuds to lessen and restrict distractions for other people in the room. (Ahmad, 2015)

Students with visual impairments can use auditory materials such as spoken textbooks and audio CDs of recorded lessons. Students can record lectures, books, and other study materials using sophisticated audio devices, CD players, cassette players, and recording machines, and submit their assignments in audio forms. An annotated video streaming service, which includes a narrative verbal description of the visual elements



displayed on the screen, allows students with visual impairments to instantly hear descriptions of all visual elements, allowing them to socialize and learn more effectively (Petty, 2005).

## **9. Assessment for Students with Disabilities**

Universities have a duty to provide accessible learning and teaching, as well as accessible examinations for all students. They must provide assistance and as far as possible provide adequate resources or a suitable environment to enable disabled students to fulfil all of their course requirements including assessments.

J. TAI ET AL (2022) found that, students who had access plans with adjustments to examinations - which might include additional time, stretch breaks, separate rooms, an oral format, or assistance such as a scribe or technology – felt that, when implemented, their adjustments were usually helpful in allaying their stress around demonstrating their capabilities. Also has been found that physical arrangements contributed to inclusion in a number of ways for example, when the students were provided with a quiet room separate to the large examination hall. Shifting to remote/online examinations due to Covid-19 had substantial benefits for students with a range of conditions, including not having to travel long distances, being able to access the physical supports they needed, and taking breaks without fuss. Access to special equipment, such as a more comfortable chair or a standing desk, was also often an important adjustment for students. The time configuration of examinations impacted inclusion. Additional time was a common and much-appreciated adjustment for students.

Uni. of Sun. (2012) defined 13 types of accommodation, these are: Extra Time, Separate Room, Rest Breaks, Alternative Format Papers, Technology, Recording Answers, Braille & Tactile Diagrams, Amanuensis, Reader, Sign Language Interpreter, Vivas, Other Accommodations such as large desk or table to accommodate equipment, and assistive technology or Braille papers, or others.

At Universities and HEI academic, technical and administrative staff should:

1. Understand the Guidelines -of the University- regarding suitable ways for exams' participation of SwD.

2. Understand the importance of disabilities provisions in assessments
3. Understand the mechanism for involvement of the University Disability Advisers and the process for deciding upon what requirements need to be provided
4. Understand the implementation of disabilities provisions for written examinations
5. Understand how the examinations for disabled students run differ from the other examinations run
6. Feel more confident by preparing the examinations for disabled students and know the responsibilities inherent for these students.
7. Understand that extra resources may be needed during examinations with disabilities provisions, see table Accommodations for each disability type,
8. Know the importance of communicating the extra requirements needed in the examinations for disabled students.

## 9.1 Accommodations in Assessment for Students with Disabilities

Making an accommodation in examination generally means that some aspect of the examination or testing condition is altered so that a student with a disability can more fully show what he or she knows or can do (Mrodriguez 2010).

Accommodations in the classroom and those in assessment situations tend to fall into several types of changes – Timing and Scheduling, Setting, Presentation, Response:

1. **Presentation Accommodations:** Allow students to access information in ways that do not require them to visually read standard print. These alternate modes of access are auditory, multi-sensory, tactile, and visual.

**Presentation accommodations** such as large print, magnification devices, sign language, braille, tactile graphics, human readers, audiotape or CD and audio amplification devices

2. **Response Accommodations:** Allow students to complete activities, assignments, and assessments in different ways or to solve or organize problems using some type of assistive device or organizer.

**Response accommodations** such as scribe, word processor, tape recorder, responding in test booklet (not on answer sheet), monitoring of test response, if answer sheet is used, calculators, spelling and grammar device.

3. **Setting Accommodations:** Change the location in which a test or assignment is given or the conditions of the assessment setting.

**Setting accommodations** for example reduce distractions to student, reduce distractions to other students, change setting to permit physical access and change setting to permit use of special equipment.

4. **Timing and Scheduling Accommodations:** Increase the allowable length of time to complete an assessment or assignment and perhaps change the way the time is organized.

**Time/Scheduling** such as extended time, multiple or frequent breaks, change schedule or order of activities.

Assessment accommodations tend to be - and should be - similar to classroom accommodations students with disabilities receive, so that the students are familiar with the accommodation before using it in a formal testing situation (Mrodriguez 2010).

## 9.2 Example: Written examinations for students with disabilities

The written examinations for students with disabilities often involve the following (Uni. of Aber. 2018):

- Students may be entitled to extra time to sit the written examinations, often due to dyslexia or other visual or reading or physical difficulties.

The exact extra time requirements can indicate following assessment by the University's Disability Advisers. Usually, the extra time will be expressed by the University's Disability Advisers as a unit of time per hour e.g.

Extra 10 minutes per hour

Extra 15 minutes per hour

Extra 20 minutes per hour

If possible, it is strongly recommended for students with extra time to sit the examination in a different room from the rest of the students to reduce disruption to the students with extra time when the rest of the students complete the examination. However, this may not always be possible due to staff or room availability. In that case, it is important the exam invigilators know the students who are entitled to extra time and ensure that there is minimal noise when the rest of the students leave the examination room.

- A reader or scribe may be required for students with specific difficulties related to reading the exam paper or writing their answers. In this case, the student may be requiring a private room to ensure they are able to communicate with their scribe / reader whilst minimising disruption to other students. The scribe or reader should not be able to provide help with the content of the exam paper – i.e. no explanation of the question is given, no other factual help or advice is provided and the scribe writes exactly what the student dictates.
- Students may require a private room to sit examinations – without any, or with a reduced number of other students in the same room. Where this is stipulated

by a Disability Adviser, this must be adhered to. They may also require a specific environment – such as specific seating, desk or writing equipment.

- Students may require to use a computer to either read the examination paper or provide their answers. It is usually advisable for this to be carried out in a private room also where possible to avoid excessive disruption to other students.
- Students may need access to food or drink throughout the examination and again this should be accommodated. A private room may be advisable if it is felt that this provision would cause disruption to other students.
- Students may require the written examination papers to be produced with specific fonts, font size or coloured paper as per the Disability Advisers' instructions and this should be accommodated where possible.
- Written examinations often require separate and even individual student rooms for students to sit the examination. Therefore, there must be an invigilator in each of the rooms at all times. These available rooms, invigilators and scribes must be prepared for in advance.
- Some examinations required extra equipment and extra tools (Computers, Software and Hardware), required more space is in the classroom or that a student may need help with performing some tasks. These rooms must be prepared before the exams (Uni. of Aber. 2018).

### 9.3 Accommodations for each disability type

Table 4 show the accommodations for different disability type at the University of Athens in Greece (G. Kouroupetroglou and A. Pino 2022).

	Disability Type	Instruction/Laboratory Accommodations	Accommodations in the Exams	Accessibility Unit's Services
1	Total loss of vision	<ul style="list-style-type: none"> <li>• verbalizing visual information indicate who is speaking</li> <li>• address SwD always by their name</li> <li>• when speaking, have your face turn towards the SwD</li> <li>• verbal description of any visual information transmitted in class</li> <li>• read out loud anything written on the blackboard or being presented</li> <li>• providing notes, educational material, textbooks in accessible form</li> </ul>	<ul style="list-style-type: none"> <li>• extra testing time</li> <li>• use an accessible PC and Assistive Information Technologies</li> <li>• exam questions in accessible form</li> <li>• answering the exam questions using braille system</li> </ul>	<ul style="list-style-type: none"> <li>• Accessible workstations in the university libraries</li> <li>• providing academic textbooks in accessible form</li> <li>• free software for persons with disabilities</li> <li>• Voluntary Support Service</li> </ul>
2	Partially sighted-low or reduced vision-low visual acuity	<ul style="list-style-type: none"> <li>• use an accessible PC and Assistive Information Technologies</li> <li>• read out loud what is written on the blackboard</li> <li>• notes/educational material in accessible form</li> <li>• reserve a seat for the SwD at the front</li> <li>• adjust light intensity</li> </ul>	<ul style="list-style-type: none"> <li>• extra testing time</li> <li>• use an accessible PC and Assistive Information Technologies</li> <li>• exam questions in accessible form</li> </ul>	<ul style="list-style-type: none"> <li>• Accessible Workstations in the University Libraries</li> <li>• providing Accessible Academic Textbooks</li> <li>• free software for persons with disability</li> </ul>

		<ul style="list-style-type: none"> <li>• use large letters when you write on the blackboard and large font for presentations</li> <li>• use appropriate visual contrasts</li> </ul>		
3	Total loss of hearing	<ul style="list-style-type: none"> <li>• reserve a seat for the SwD at the front, so that he/she can lip-read</li> <li>• when speaking have your face turn towards the SwD</li> <li>• the SwD must have an uninterrupted view of the Professor/Instructor</li> <li>• keep your pace of speech stable               <ul style="list-style-type: none"> <li>• repeat other students' questions before answering them</li> <li>• indicate who is speaking</li> <li>• extra waiting time after a question has been made (i.e. before demanding an answer)</li> <li>• alternative ways of communication</li> <li>• creating notes/educational material in accessible form</li> <li>• alternative ways of transmitting acoustic information</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• extra testing time</li> <li>• use an accessible PC</li> <li>• repeat questions/comments/remarks made by other students</li> </ul>	<ul style="list-style-type: none"> <li>• Video Relay Service</li> <li>• Voluntary Support Service</li> </ul>
4	Hard of hearing – Partial loss of hearing	<ul style="list-style-type: none"> <li>• reserve a seat for the SwD at the front, so that he/she can lip-read</li> <li>• when speaking have your face turn towards the SwD</li> <li>• the SwD must have an uninterrupted view of the Professor/Instructor</li> </ul>	<ul style="list-style-type: none"> <li>• extra testing time</li> <li>• use accessible PC</li> <li>• repeating questions/ comments/remarks made by other students</li> </ul>	<ul style="list-style-type: none"> <li>• Video Relay Service</li> <li>• Voluntary Support Service</li> </ul>

		<ul style="list-style-type: none"> <li>• keep your pace of speech stable</li> <li>• the Professor/Instructor must use a wireless microphone</li> <li>• repeat other students' questions before answering them</li> <li>• indicate who is speaking</li> <li>• extra waiting time after a question has been made (i.e. before demanding an answer)</li> <li>• alternative ways of communication</li> <li>• alternative ways of transmitting acoustic information</li> </ul>		
5	Loss of speech – Dysarthria	<ul style="list-style-type: none"> <li>• extra time for answering questions</li> <li>• alternative ways of answering questions (i.e. apart from orally)</li> <li>• use Assistive Information Technologies</li> <li>• alternative ways of communication (i.e. apart from orally)</li> </ul>	<ul style="list-style-type: none"> <li>• use accessible PC</li> <li>• use Assistive Information Technologies</li> <li>• taking only written exams</li> </ul>	<ul style="list-style-type: none"> <li>• Video Relay Service</li> <li>• free software for persons with disabilities</li> </ul>
6	Upper limb motor disability	<ul style="list-style-type: none"> <li>• adapt laboratory equipment</li> <li>• use Assistive Information Technologies for accessing PC, writing and reading books</li> <li>• providing textbooks, notes/educational material in accessible form</li> </ul>	<ul style="list-style-type: none"> <li>• extra testing time</li> <li>• use Assistive Information Technologies/accessible PC</li> <li>• writing assistant</li> </ul>	<ul style="list-style-type: none"> <li>• put forth specific Assistive Information Technologies to the SwD</li> <li>• provide accessible academic textbooks</li> </ul>



		<ul style="list-style-type: none"> <li>voluntary students can assist SwD in handling laboratory equipment</li> </ul>		<ul style="list-style-type: none"> <li>Voluntary Support Service</li> <li>Accessible workstations in the University Libraries</li> <li>free software for persons with disabilities</li> </ul>
7	Lower limb motor disability	<ul style="list-style-type: none"> <li>accessible classrooms/lecture halls/laboratory facilities</li> <li>find an appropriate seat for the SwD</li> <li>use a special portable desk</li> <li>Laboratory assistant (volunteer student) and/or for carrying objects</li> <li>disregard the SwD coming late to class</li> <li>there must be an accessible toilet nearby</li> </ul>	<ul style="list-style-type: none"> <li>take the exam in an accessible room using an accessible desk</li> <li>use a special portable desk</li> <li>there must be an accessible toilet nearby</li> </ul>	<ul style="list-style-type: none"> <li>Transportation Service</li> <li>Voluntary Support Service</li> </ul>
8	Attention deficit with or without hyperactivity disorder	<ul style="list-style-type: none"> <li>brief and precise instructions/questions</li> <li>eye-contact</li> <li>announce coursework and exam schedule as early as possible</li> <li>extra time for delivering assignments</li> <li>extra time for completing exercises in the classroom or mid-term exams</li> </ul>	<ul style="list-style-type: none"> <li>extra testing time</li> <li>disregard orthographic, grammatical and syntactical mistakes</li> </ul>	<ul style="list-style-type: none"> <li>Voluntary Support Services</li> <li>Psychological Counseling</li> <li>free software for persons with disabilities</li> </ul>

		<ul style="list-style-type: none"> <li>disregard orthographic, grammatical and syntactical mistakes</li> <li>regular feedback</li> <li>disregard inappropriate behaviour</li> <li>reinforce positive behaviour</li> </ul>		
9	Pervasive neurodevelopmental disorders-autism-Asperger	<ul style="list-style-type: none"> <li>use literal language (avoid metaphors)</li> <li>disregard inappropriate/unexpected behaviour</li> <li>should any changes in the time-schedule occur, inform the SwD as soon as possible</li> <li>find an appropriate seat for the SwD in the classroom</li> <li>explain to the SwD how and when he/she can participate in the class (set rules)</li> <li>give answers and provide explanations to the SwD's (often persisting) questions</li> <li>regular feedback</li> <li>support by volunteer-students</li> </ul>	<ul style="list-style-type: none"> <li>extra testing time</li> <li>taking the test in a room that is not crowded (either with a few students or alone)</li> <li>explaining the rules of the exam process</li> <li>give answers and provide explanations to the SwD's (often persisting) questions</li> </ul>	<ul style="list-style-type: none"> <li>Voluntary Support Services</li> <li>Psychological Counseling</li> </ul>
10	Dysanagnosia (dyslexia)	<ul style="list-style-type: none"> <li>creating accessible notes</li> <li>brief and precise questions/instructions</li> <li>extra time for completing assignments or exercises in class</li> </ul>	<ul style="list-style-type: none"> <li>extra testing time</li> <li>using accessible PC</li> </ul>	<ul style="list-style-type: none"> <li>Accessible workstations in the University Libraries</li> <li>free software for persons with disabilities</li> </ul>

				<ul style="list-style-type: none"> <li>Voluntary Support Service</li> </ul>
11	Dysgraphia (dyslexia)	<ul style="list-style-type: none"> <li>creating accessible notes</li> <li>extra time for completing assignments or exercises in class</li> </ul>	<ul style="list-style-type: none"> <li>extra testing time</li> <li>disregard orthographic, grammatical and syntactical mistakes</li> <li>using accessible PC</li> </ul>	<ul style="list-style-type: none"> <li>free software for persons with disabilities</li> <li>Voluntary Support Service</li> </ul>
12	Dyscalculia (dyslexia)	<ul style="list-style-type: none"> <li>creating accessible notes (and educational material in general)</li> <li>the notes should be uniformly formatted</li> </ul>	<ul style="list-style-type: none"> <li>extra testing time</li> <li>use accessible PC</li> <li>use calculator</li> </ul>	<ul style="list-style-type: none"> <li>free software for persons with disabilities</li> <li>Voluntary Support Service</li> </ul>
13	Chronic/severe disease	<ul style="list-style-type: none"> <li>extra time for completing assignments during classes</li> <li>regular feedback</li> <li>disregard the SwD's frequent absences</li> <li>respect patient's confidentiality concerning the SwD</li> </ul>	<ul style="list-style-type: none"> <li>extra testing time</li> <li>taking the test in a room that is not crowded (either with a few students or alone)</li> <li>invigilators must have knowledge of the SwD's problem and how to treat him/her</li> </ul>	<ul style="list-style-type: none"> <li>Voluntary Support Service</li> <li>Psychological Counseling</li> </ul>
14	Psychosocial problems	<ul style="list-style-type: none"> <li>disregard inappropriate behaviour</li> <li>reinforcing positive behaviour</li> <li>careful interpretation of the SwD behaviour</li> <li>announcing tasks and exam schedule as early as possible</li> <li>announcing the material to be taught as early as possible</li> <li>give brief and specific instructions</li> <li>regular feedback</li> </ul>	<ul style="list-style-type: none"> <li>extra testing time</li> <li>taking the test in a room that is not crowded (either with a few students or alone)</li> <li>invigilators must have knowledge of the SwD's problem and how to handle it</li> </ul>	<ul style="list-style-type: none"> <li>Voluntary Support Service</li> <li>Psychological Counseling</li> </ul>

		<ul style="list-style-type: none"> <li>respect patient's confidentiality concerning the SwD</li> </ul>		

## 9.4 List of equipment needed

Table 5 show the need equipment for Accessibility Unit and accommodations for disable students

Software and Hardware	Disability	Model
Reading with Text-to-Speech for iOS and Android	Blindness, Low vision, Motor function, Dyslexia, Autism	Voice Dream Reader
Speech synthesis	low vision, blindness, learning	Acapela TTS Voices for NVDA
Speech synthesis for android	low vision, blindness, learning	Acapela TTS Voices for google
Speech synthesis for ios	low vision, blindness, learning	Acapela TTS Voices for ios
Wireless braille display with wide screen reader compatibility	blindness	OPTELEC ALVA USB 640 Comfort
Wireless access set with: 5 wireless switces, wireless joystick, wireless trackball, switch mixer, wireless transmitter, android receiver, ios receiver, PC infrared receiver	motor disability upper extremities	SimplyWorks Wireless
Writing with Text-to-Speech for iOS	Blindness, Low vision, Motor function, Dyslexia, Autism	Voice Dream Writer
Desktop video magnifier	Blindness, Low vision, Motor function, Dyslexia, Autism	ClearView C Speech 24" High Definition
AAC software package	motor disability upper extremities	GRID 3
Computer access system through gaze interaction	motor disability	Tobii Windows Control for PCEye Mini
eye gaze tracker	motor disability upper extremities	TOBII PCeye Mini
Grasp switch	motor disability upper extremities	Ablenet Grasp Switch

Gyroscopic mouse system	motor disability upper extremities	EnPathia computer access
Hard round button switch	motor disability upper extremities	Ablenet Jelly Bean Twist
Head mouse	motor disability upper extremities	NaturalPoint SmartNav 4AT
Joystick	motor disability upper extremities	Pretorian Technologies n-ABLER Joystick
On-ear bluetooth headphones with microphone	low vision, blindness, motor disability	SBS Sport Stereo Headphone Sport Runway Fit
Rectangle button switch (foot switch)	motor disability upper extremities	G-SWITCH SERIES GS04
Soft round button switch (pillow switch)	motor disability upper extremities	Ablenet Pillow Switch
Standard keyboard and keyguard	motor disability upper extremities	Maxess Cherry Internet CyMotion Keyboard και Keyguard
Switch mounting solution (arm + base + holder)	motor disability upper extremities	Ablenet Friction Knob Universal Mounting System and Ablenet Universal Mounting Plate
Touch Pad switch	motor disability upper extremities	Ablenet LITTLE Candy Corn Proximity Sensor Switch
Trackball	motor disability upper extremities	Pretorian Technologies n-ABLER Trackball
Speech to text application for computers	low vision, blindness, motor disability, learning	Dragon Professional Individual
Big Keys computer keyboard with keyguard	low vision, upper extremities	Greystone Digital BigKeys LX White / QWERTY Keyboard και BigKeys LX Keyguard
DAISY reader	all	Dolphin EasyReader for Windows
Speech synthesis	low vision, blindness, learning	Acapela TTS Voices for NVDA
Big Keys computer keyboard with keyguard	low vision, upper extremities	Greystone Digital BigKeys LX White / QWERTY Keyboard και BigKeys LX Keyguard
accessible office suite for accessing and creating educational content	all	Microsoft Office Standard Open License Academic
Document Scanner for computer use	all	Epson Scanner Perfection V370
On-ear bluetooth headphones with microphone	low vision, blindness, motor disability	SBS Sport Stereo Headphone Sport Runway Fit
Screen Reader & Magnifier	low vision, blindness, learning	Dolphin Supernova magnifier and screen reader
Speech synthesis	low vision, blindness, learning	Acapela TTS Voices for NVDA

Touch tablet (+software for development of audio-tactile graphics)	blindness	IVEO 3 Hands-On Learning System
Speech to text application for computers	low vision, blindness, motor disability, learning	Dragon Professional Individual
DAISY reader	all	Dolphin EasyReader for Windows
equation editor with speech output	all	ChattyInfty
Braille embosser	blindness	Index Everest V5
Braille translation software	blindness	Duxbury DBT Win 12.4 sr1
Complete PDF solution	all	ADOBE Acrobat Pro 2017
OCR software for windows	all	ABBYY FineReader 14 Corporate
reader for math	all	InftyReader
Speech synthesis	low vision, blindness, learning	Acapela TTS Voices for NVDA
Tactile graphics maker	blindness	PIAF Picture in a Flash Tactile Graphic Maker
On-ear bluetooth headphones with microphone	low vision, blindness, motor disability	SBS Sport Stereo Headphone Sport Runway Fit

## 10. What is Universal design for learning (UDL)

Universal design for learning (UDL) is an approach to designing course instruction, materials, assessment and content so that all students are able to access learning with a diminished need for retrofitting or accommodation. UDL is a change in mindset and a framework for inclusion (K. Riviou and G. Kouroupetroglou 2014). It supports the varied identities, competencies, learning strengths, and needs of every student in our classroom and school community. The UDL Guidelines are the tool to support the enactment of inclusive practices.

UDL emphasises flexibility and individuality while also planning for variability and diversity from the beginning of the planning process; that goals are clear and specific to the expected outcome; and that student assessment is flexibly designed to enable every student to demonstrate their knowledge, values, understanding, and skills in a variety of ways. UDL has the potential to promote the engagement and independence of students to become what Meyer et al. describe as 'expert learners'.

In UDL, barriers to learning are the environment, curriculum, and context, not the student. These barriers can be removed by designing intentionally for predictable variability. As we strive to create meaningful and purposeful learning experiences for every student, with the goal of developing expert learners, UDL highlights three design principles that provide a map for teachers: engagement, representation, and action and expression (M. Flood 2021).

Figure 1 show the three principles of UDL: The UDL Guidelines are a tool used in the implementation of Universal Design for Learning, a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn. Three primary principles, which are based on neuroscience research, guide UDL and provide the underlying framework for the Guidelines

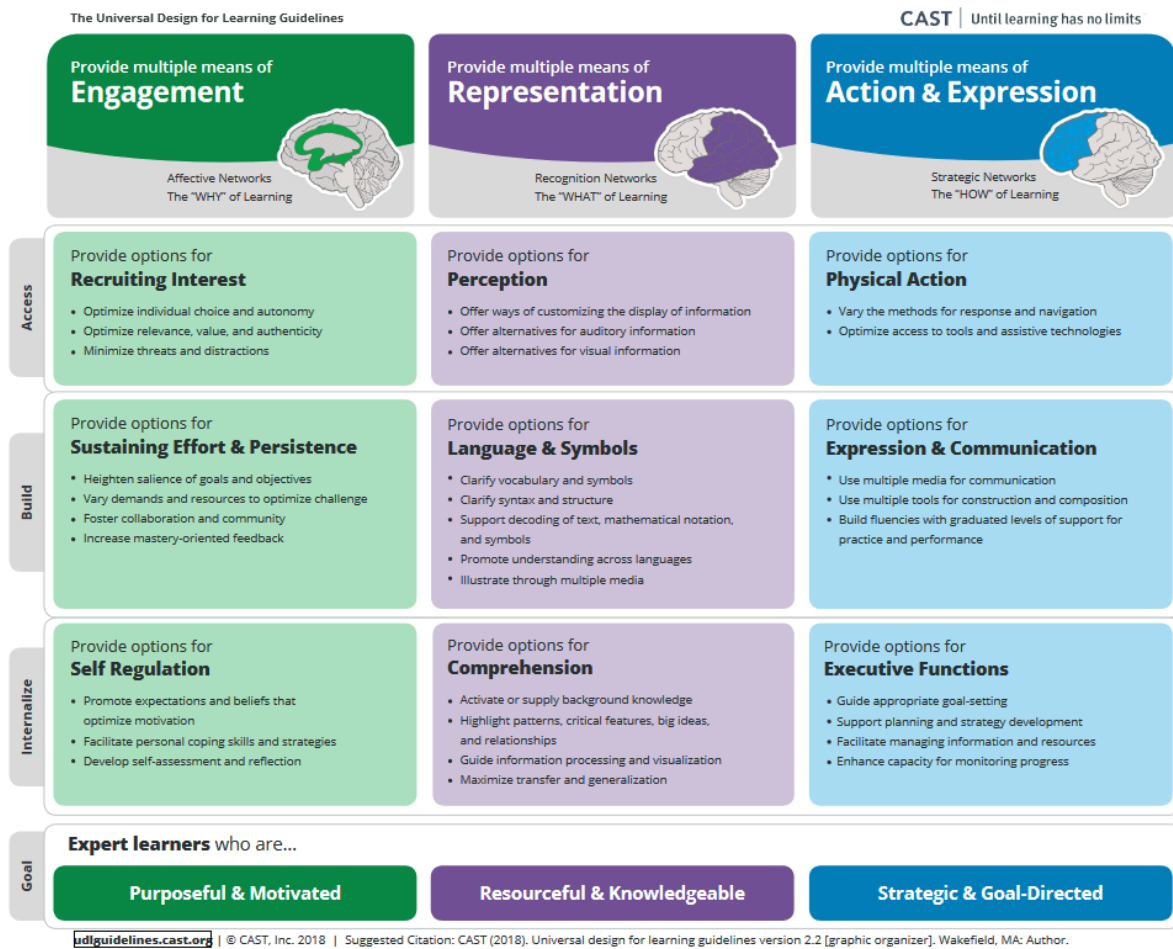


Figure1: The three principles of UDL (Meyer, A., Rose, D.H., & Gordon, 2014)

The UDL Guidelines can be used by educators, curriculum developers, researchers, parents, and anyone else who wants to implement the UDL framework in a learning environment. These guidelines offer a set of concrete suggestions that can be applied to any discipline or domain to ensure that all learners can access and participate in meaningful, challenging learning opportunities (CAST 2018).



Figure 2,3 &4 show Quick Reference Card and suggestions for applying UDL: The Quick Reference Card was one product outcome of the European funded project UDLnet. This outcome is an instrument designed to introduce its reader to the concept of UDL. Teachers can use this instrument to compare their own teaching style while providing the opportunity to consider a framework that illustrates how to be innovative in relation to individual teaching and learning practices. The card underpins the WHAT, the HOW and the WHY of learning with questions to be answered on the front page. The other side of the card provides inspiration and proposals and how to implement. Advantages of this card are as follows: it summarises the necessary UDL details; it's presented in a manageable pocket size format; and the reader is guided easily throughout the tool.

In order to make the application of these guidelines easier in every day school practice, UDLnet has developed the following reference card (Zygouritsas 2015, K. Riviou, G. Kouroupetroglou and A. Bruce 2014).

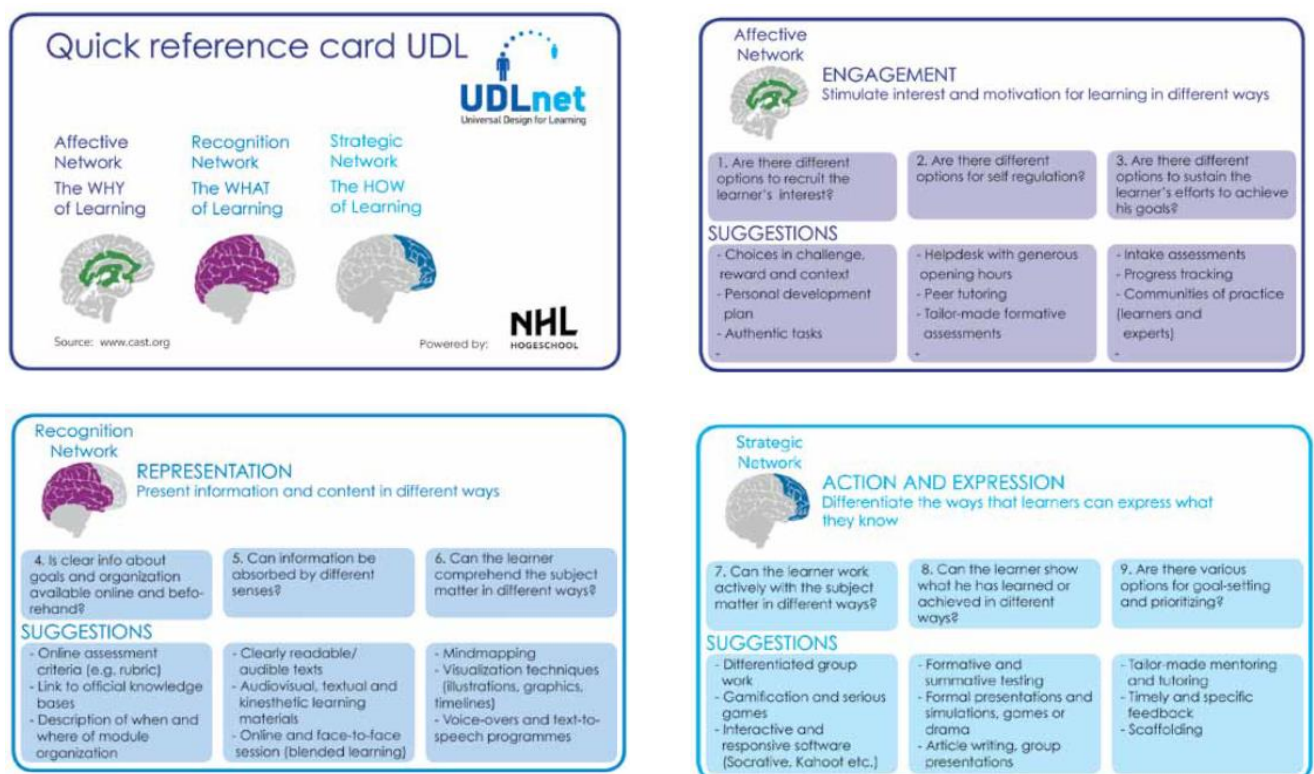
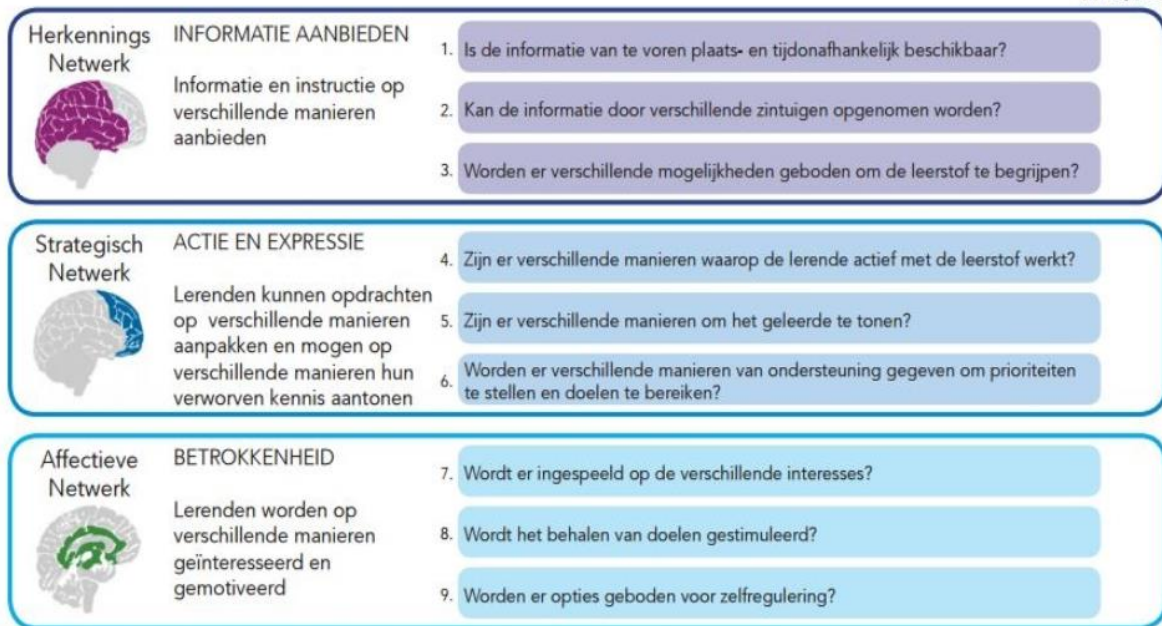


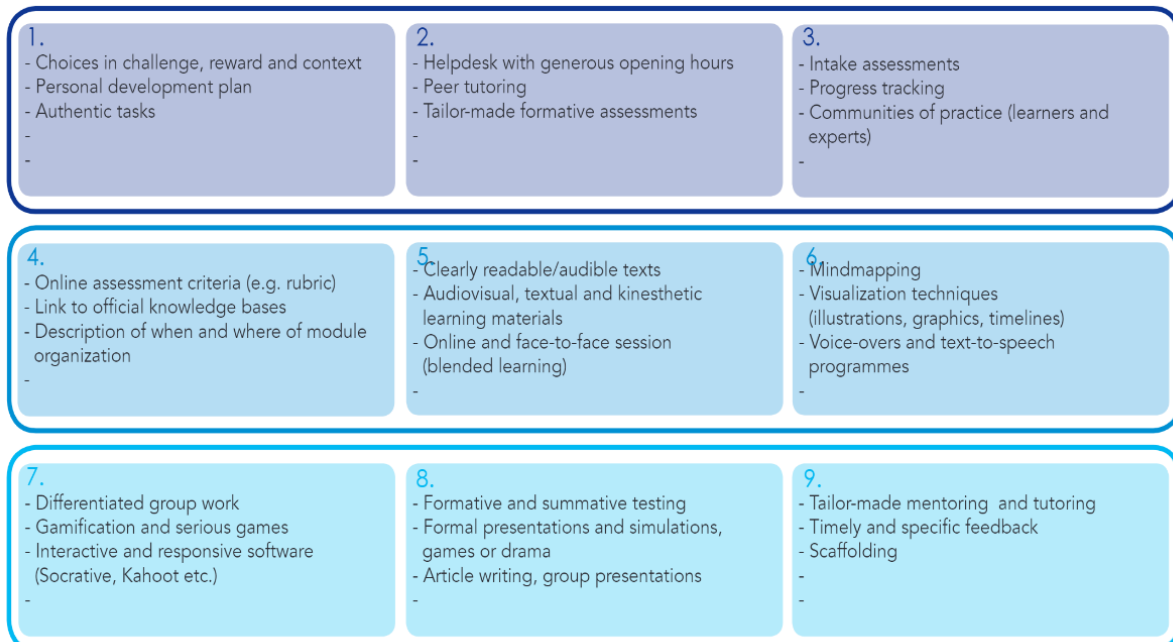
Figure 2: Quick Reference Card for UDL (Zygouritsas 2015).



Bron: www.cast.org

Figure 3 Quick Reference Card UDL (Zygouritsas 2015)

## SUGGESTIONS



Powered by: NHL University of Applied Sciences

Figure 4: Suggestions for applying UDL (Zygouritsas 2015)

## 10.1 Multiple Means of Engagement

Provide options and a variety of ways for students to interact with the course content, their classmates, and you, as the instructor. Allow students to make choices in as many aspects of the course as possible, thus building their autonomy and self-determination

Students differ greatly in the ways they can be engaged or motivated, and that external factors can impact on this. Here we need to ask ourselves: How can and will our students engage?

To facilitate student engagement, we need to consider variability. Various elements can influence individual variation in how students engage, including neurology, culture, personal relevance, subjectivity, and background knowledge. In reality there is not one means of engagement that will work best for every student in every context.

Some will be immediately turned off by the task or topic. Others will be interested and ready to participate straight away. Some will tire easily and lose interest because of the physical or cognitive effort involved in achieving the learning goal. Others will look forward to the practical elements. If we provide multiple, intentionally designed options for engagement, then we will offer a way in for each student (M. Flood 2021).

## 10.2 Multiple Means of Representation

Present content in different formats and allow students to choose the formats in which they learn best. Provide text options when audio is used and audio or text options where visuals are used. This allows students to gain access to content via the methods most accessible to them.

Every student perceives and comprehends the information presented to them differently. Here we need to ask ourselves:

How will students perceive the content we present?

After that: How do we present our content in a way that provides access for each of our students to engage with the learning?

Like engagement, there is not a one-size-fits-all means of representation. Some will not have sufficient access through text and will process information better through

visual or auditory means. Others will enjoy independently exploring the content. Some will work better if they can access instructions in stages as they work through the content or task (M. Flood 2021).

### 10.3 Multiple Means of Action & Expression

Create different ways for students to demonstrate understanding. Certain types of assessments can create barriers for some learners. Providing choice helps them avoid those barriers and better demonstrate what they know. Also, offer different ways for students to communicate and participate during class

Every student navigates their learning environment and expresses what they know differently. Here we need to ask:

How can our students best act on their learning and demonstrate their knowledge, understanding, skills, and values?

And are we giving students the opportunity to show their best selves?

There is no one perfect means of action and expression. It is about being clear on the goal of the task and providing those intentional options to students that enable them to achieve. Some will not know how to start a task or how to express themselves clearly, or they may be unable to plan their actions. Others will have a system for planning their actions and will easily craft an essay, project, or presentation to display their knowledge. Some may be able to express themselves well in writing but not speech, and vice versa. Thus, if only one act of expression is offered to students, they may feel they will not accomplish the task well – and we're back to engagement (M. Flood 2021).

In order to make the application of these guidelines easier in every day school practice, UDLnet has developed the following reference card.

## 10.4 UDL Strategies

Table 02 show an example of UDL Strategies and how to implement it.

UDL Strategies	
During Instruction	<ul style="list-style-type: none"> <li> <b>Use more than one method for presenting information</b>            If teaching in a traditional lecture format, include slides or other visuals to support any auditory instruction. If using a visual diagram to demonstrate a concept, also include a written or audio description.         </li> <li> <b>Post or email slides in advance of each class</b>            This allows students to focus the auditory content and discussion in class, rather than trying to copy down information from a slide.         </li> <li> <b>Vary the pacing of lessons</b>            Keep lessons moving but allow time for individual and group interaction with the content.         </li> <li> <b>Share notes</b>            Ask a student to share a copy of their notes with the class or consider having students crowdsource notes on a shared Google document. This is a great way to help students learn collaboratively and clear up misunderstandings in real time.         </li> <li> <b>Record your lectures and post the videos to Blackboard.</b> This allows students to return to the lecture to clarify misunderstandings or missed content.         </li> <li> <b>Provide concrete examples and applications.</b> Don't assume that students are able to generalize the content – show them how it's done. Connecting content to real-life,         </li> </ul>

	concrete examples helps to build understandings and transfer of skills.
<b>When Establishing Course Policies</b>	<ul style="list-style-type: none"> <li> <b>Determine what is essential</b>            Be purposeful when creating learning objectives and course standards. This will help you identify areas in which flexibility may be possible. Make sure these objectives are clearly stated for students.         </li> <li> <b>Make expectations clear</b>            Provide students with detailed instructions and expectations for all components of your course, including assignments, participation, and grading.         </li> <li> <b>Build in flexibility with deadlines</b>            Flares of disability conditions, life events, and access to resources can impact a student's ability to complete their work. Building in a reasonable degree of flexibility with deadlines helps to prevent students from being penalized for circumstances outside of their control.         </li> <li> <b>Consider how attendance requirements align with course objectives</b>            Are students able to complete the learning in the course without attending each class? If so, relax your attendance standards. If much of the learning is completed in class and attendance is, therefore, necessary, make sure this is made clear to your students.         </li> </ul>
<b>When Designing Assessments</b>	<ul style="list-style-type: none"> <li> <b>Provide frequent, personalized feedback</b>            This allows students to better gauge their understandings of the content and better direct their learning.         </li> <li> <b>Eliminate timed assessments</b>            Time limits can create barriers for many students, including many students with disabilities and students for whom English is not their first language.         </li> <li> <b>Provide choices for assessments</b> </li> </ul>



	<p>Allowing students options (eg., paper or presentation; exam or project) for demonstrating their understandings helps to remove barriers that are created by certain types of assessments.</p> <ul style="list-style-type: none"> <li>• <b>Use a variety of types of questions on exams</b> If exams are still your best option for assessment, vary the types of questions used. Students may run into barriers with certain formats (eg., multiple choice or true/false), so providing a variety can help with demonstrating where students are actually struggling with the content vs. struggling with the question format</li> </ul>
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Table 02: UDL Strategies

## 10.5 UDL-Aligned Strategies

UDL-aligned strategies (Prince 2021) are instructional methods and tools used by teachers to ensure that ALL students have an equal opportunity to learn. All of strategies are aligned with UDL guidelines. These guidelines help teachers to select strategies that remove barriers in instruction so that all students can achieve their learning goals.

Table 03 show an example of instructional methods and tools to implement UDL in classroom.

Tool	UDL-Aligned Strategies
<b>Think-Pair-Share</b>	<p>1. <b>Define “Think-Pair-Share.”</b> Explain to students that a Think-Pair-Share allows them to activate their prior knowledge and share ideas about content or beliefs with peers. This structure gives students a chance to organize their ideas-first in their own minds, then in a smaller group setting before sharing with the entire group. In a Think-Pair-Share, students Think individually about the question or idea(s) put forth, Pair up with someone to discuss their thinking, and then Share their</p>

	<p>conversation with their table group, and then finally with the whole group.</p> <p><b>2. Display Think-Pair-Share prompts about a concept or topic.</b> Give students 1-2 minutes to think about the prompt on their own. Then discuss with a partner for another few minutes.</p> <p><b>3. Facilitate a whole group discussion.</b></p> <ul style="list-style-type: none"> <li>• Listen to their responses.</li> <li>• Ask students to elaborate on their thinking by providing explanations, evidence, or clarifications. Suggested probing questions: <ul style="list-style-type: none"> <li>○ What makes you think that?</li> <li>○ Please give an example from your experience.</li> <li>○ What do you mean?</li> </ul> </li> <li>• Try to stay neutral in your reaction to students' comments.</li> <li>• Invite others to react and respond to ideas by providing alternative viewpoints, agreements or disagreements. Suggested probing questions: <ul style="list-style-type: none"> <li>○ Can anyone add something to that comment?</li> <li>○ Who would like to share an alternative opinion?</li> </ul> </li> </ul>
<b>Quick write</b>	<p>A prompt is posed for students to respond to in writing. Taking only 5 minutes or so, this is a quick way to accomplish one or more of the following: determine whether or not students have done the homework assignment, engage students in thinking about the topic that will be covered in the session, provides the opportunity for students to access their prior knowledge on a topic. The quick write can be graded to encourage students to do their reading assignment, or collected to serve as an attendance check.</p>
<b>Turn and Talk</b>	<p>In a turn and talk, a question is posed to the class and students simply turn to the person next to them to</p>



	<p>discuss. This can serve as a comfortable way for students to share their ideas with others and set the stage for them sharing with the larger group. The instructor doesn't need to hear all (or any) of the ideas shared - the important aspect of this strategy is for the peers to share and for individuals to access their prior knowledge about a topic. Example prompt: Ask students to turn to someone next to them and discuss their responses to the following question. Tell them to take two minutes to discuss this with their partner with each person getting some time to talk.</p> <ul style="list-style-type: none"> <li>• Part of the challenge of communicating climate change with the public is that there is a disparity between what scientists and the non-scientist public think and know about climate change.</li> <li>• Why do you think there is such a disparity</li> </ul>
<b>Polling</b>	<p>Having students vote anonymously on what they perceive as the best explanation/answer to a question, followed by opportunities to discuss their ideas with peers, and then to vote again leads to greater learning of the material. It is important to have students discuss why they think their explanation is the most accurate and also why the other explanations proposed are not accurate. It is also important that the teacher looks at the polling results and listens to the reasoning of the students in order to determine what further explanations and summary might need to be made in lecture. There are various tools that can be used for polling, including Clickers, Socrative.com, and Poll.Everywhere.com.</p>
<b>Individual Plus Group Quizzes</b>	<p>Give students a quiz that they complete individually and turn in to be graded. Immediately following the individual quiz, put students in small groups and have them take the quiz again, but this time they discuss the answers in</p>

	<p>their group and turn it in for a group score. Both quizzes are graded and if the group score is higher, the two grades are averaged. The group score can't hurt someone if they have a higher individual score. This encourages individual accountability and also helps students to better understand the material as they discuss it with peers. In this way, they keep up with the material, rather than realizing they don't totally understand it when they reach the midterm.</p>
<b>Tests/Quizzes with Common Preconceptions as Distracters</b>	<p>Design assessments to include common preconceptions (or misconceptions) that students often hold. Allow students to answer the question on their own and then discuss their answer and rationale with a partner. Have them answer the question again after the peer discussion. Elicit a whole group discussion about why the correct answer is correct and why the others are not. Common misconceptions students have about STEM topics and concepts can be found at AAAS, and assessment questions including common misconceptions as distracters can be found at Braincandy.</p>
<b>Jigsaws</b>	<p>Students work in small groups to read information that has been organized into sections. Each student in the group reads one section of the material and then shares that information with the rest of their group. As they read and share information, they refer to prompts such as: what do you think each idea means? What is the big idea? How can this idea be applied to help understand the concept(s)? What questions do you have about what you read? What do you agree/not agree with?</p> <p>There are various permutations of jigsaws. One such model includes expert and cooperative groups: Each group can be assigned a particular aspect/part of the</p>

	<p>overall information – they read it individually and then discuss in their small “expert” group to make sure they all understand it. Then new “cooperative” groups are formed made up of one-two students from each of the original expert groups. In this way, the new groups have an “expert” representative from each of the original groups so that all of the information is now represented in the new cooperative group. The “expert” has had a chance to practice sharing and hearing other viewpoints about the information in their original group, and therefore likely feels more comfortable sharing in the new group.</p>
<b>Sorting strips</b>	<p>Small bits of information are separated into strips so that students can sort the strips into various categories, or organize them into a sequence depending on the topic. This strategy encourages discussion of competing ideas or organizations or order in which a process would take place. In this case, it is often the discussion and sharing of ideas that is the most important outcome of the activity.</p>
<b>Partial Outlines/ PPTs Provided for Lecture</b>	<p>Research has shown that students have a better understanding, do better on exams, and stay more engaged with the content during the lecture when they are provided with partial, rather than complete lecture notes or PowerPoints.</p>
<b>Pausing in lecture</b>	<p>These strategies work towards inserting wait time in lectures for students to reflect on, discuss and apply ideas just presented and to encourage them to engage actively in the lecture rather than passively taking notes. These strategies also help students to understand what they do and don’t understand about the lecture.</p> <ul style="list-style-type: none"> <li>ask students to not take notes as you work through a problem on the board with the class, followed by</li> </ul>

	<p>5 minutes for them to copy down board and discuss the problem/chemical reaction/process with peers</p> <ul style="list-style-type: none"> <li>• pause 6-10 seconds after asking a question before calling on a student to respond have students do a quick write about a concept just covered in lecture (e.g. their understanding, two questions they have about the concept as presented, what they would like to know more about etc.); optional, collect the quick write to help you better understand what they understood from the lecture and the questions they have and to keep them engaged</li> <li>• turn and talks – ask peers to talk to each other about what they do and don't understand and/or share with each other what they wrote down in their notes about a particular concept just covered in lecture. Encourage students to add to their notes from the discussion</li> <li>• have students apply their understanding of a concept just covered by working with a small group around a huddle board. Optional, have a few groups share their work and elicit reactions and reviews from other students. Summarize findings and scientific normative explanations.</li> <li>• Have students do think-pair-shares, polling to keep their mind engaged in the topic and to share their ideas with their peers for greater meaning-making opportunities</li> </ul>
<b>Posters &amp; gallery walk</b>	<p>Give groups of students an assignment that they need to work on together and present their ideas on a sheet of chart paper. Once they have completed their poster, have them display it on the wall, much like at a scientific poster session. One of their group will stay with the poster and help to explain it as the class circulates to</p>

	look at all of the posters. Students take turns standing by their poster so that each of them has the chance to visit the other groups' posters. This sets up a more interactive way of presenting as compared to ppt presentations.
<b>Fishbowl</b>	A fishbowl allows a small group of students to engage in a discussion about ideas or concepts that have alternative explanations while the rest of the class observes and takes notes. An inner circle of students engages in the discussion, while the rest of the class either sits in an outer circle, or remains in their regular seats and observes. If you have your class organized into small groups, then the members of each group can tap their respective teammate and replace them in the inner circle to expand on or provide additional evidence to support an explanation. Optional: the entire class needs to take part in the inner circle conversation by the end of the class period.
<b>Idea line up</b>	<p>The idea line up is a structure that allows a teacher to use the diversity of perspectives in the classroom to generate heterogeneous groups of students for discussion. This diversity of thinking is a good place from which to develop a classroom climate that supports argumentation. More student-initiated science talk happens when students are connected with peers who have opposing perspectives (Clark &amp; Sampson, 2007). The question should be one about which students have enough prior knowledge/experience to have some evidence to bring to bear in the discussions which ensue.</p> <p>How it works: The teacher provides a question that (s)he knows may have a continuum of responses, especially if it is asked prior to collecting significant amounts of</p>

	<p>evidence or before students have the opportunity to synthesize the evidence they have already collected.</p> <p>The question is displayed prominently for students to consider. Students are directed to position themselves on a line to indicate their level of agreement in response to the question. After the students line up, have students talk to the person next to them so they can clarify their own thinking on why they positioned themselves on the line in a particular spot.</p> <p>Student positions on the line typically indicate a diversity of thinking. The teacher can then use their positions to form groups of students with differing ideas about the question. Students then discuss their thinking and reasoning for their responses with the peers with whom they have been matched. Students should be prompted to listen carefully to each other's claims and evidence and respond with evidence to counter or support the claims of other students in their group. A group claims and evidence chart or small whiteboards can be used to collect student thinking.</p> <p>If the activity is used prior to an investigation, students can use the ideas from the initial discussion to continually weigh against the evidence they gather from their investigations. If the activity is used after an investigation, but prior to a whole-group meaning-making discussion, ideas from the small group discussions can be used to prepare for a whole group discussion.</p>
<b>Four corners</b>	<p>Four corners is used for the same reasons as the idea line up. The only difference is that students are considering several claims (responses to a question). For example, a teacher might ask, "Where does most of the mass in a plant come from?" Claims for</p>

	<p>consideration might include, “soil,” “air,” “water,” and “sunlight.”</p> <p>How it works: The teacher displays the question prominently for all to consider. Each corner of the classroom is assigned one claim, also prominently displayed. Students are asked to go to the corner of the classroom that has the claim they agree with most. If they think more than one answer is correct, they should just pick one of the corners they agree with. If they don’t agree with any claims, they should go to the middle of the room. Once in their corners, students should discuss with others why they chose that corner to help clarify their thinking. Have them share and record evidence that supports that claim and why the other claims are not supported. Optional: have them visit the other corners to see what others thought about the ideas and the evidence they put forth.</p> <p>Just as in the idea line up the teacher can use the student positions around the room to form groups with a diversity of ideas. The rest of the instructions are the same as for the idea line up.</p>
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Table 03: Instructional methods and tools UDL-aligned strategies

## 11. Conclusion

Ease of access is a recognition of variety as well as a critical aspect in ensuring that students effectively engage. Students with disabilities can learn on par with their non-disabled peers in the common classroom with access to knowledge, engagement, mainstream education curriculum, teaching resources, adaptive equipment, and the resources necessary assistance, breaking down all obstacles that impede them from receiving a decent education. Inclusion in education has been demonstrated to increase the effectiveness in educational practice, resulting in positive educational outcomes for students with disabilities in inclusive settings, according to research

(Katz and Mirenda, 2002). Regular schools with an inclusive focus have been determined to be the most effective in eliminating discriminatory attitudes, fostering an inclusive society, and ensuring that all children receive an education. (UNESCO, 1994).

Educators should not consider assistive technology as a 'rehabilitative' or 'remedial' tool, but rather as a tool for gaining access to material and determining how to help students achieve positive outcomes (Warger, 1998). It is critical to ensure need-based assessment - taking into account the technology's applicability and effectiveness; a sound development plan - ensuring student-centred goals and proper identification of the devices required in the plan; and successful implementation - using an action-oriented approach to assess the technology's feasibility and effectiveness, as well as effective monitoring and periodic review. Researchers, practitioners, and other system stakeholders must figure out how to support the development of technology integration tools and techniques.

In principle, this paper offers recommendations for HEIs and teaching staff who are encountering challenges while striving to make reasonable changes to curricula development processes. The university's structure, lack of technology, and lack of time have all been cited as key roadblocks to achieving appropriate reasonable adaption. However, the majority of studies stated that certain staff were prevented from taking an inclusive approach to teaching and learning because of their view of what constitutes a fair modification. The report also gave some light on the legal responsibilities that HEIs have in achieving their legal obligations and fostering inclusive practices within the university.

Although reasonable changes may still be required due to the complexity of various disabilities, ensuring reasonable adjustments are in place during the earliest curriculum design stages may assist in combating exclusion and promoting participation. This would imply that teachers may need to be proactive in promoting inclusive practices across the curriculum in some circumstances. Although this may aid in the resolution of some of the problems that impaired students experience. Unfortunately, this is not often a priority during the early phases of curriculum development; one contributing issue is a lack of training and awareness of disability, as well as differing interpretations of what is reasonable.

Educators should understand the Guidelines -of the University- regarding suitable ways for exams' participation of SwD, and they should understand the importance of



disabilities provisions in assessments and the implementation of disabilities provisions for examinations. Also, they should understand the need of extra resources during examinations with disabilities provisions, such as Extra Time, Separate Room, Rest Breaks, Alternative Format Papers, Technology, Recording Answers, Braille & Tactile Diagrams, Amanuensis, Reader, Sign Language Interpreter, Vivas, Other Accommodations such as large desk or table to accommodate equipment, and assistive technology or Braille papers, or others.

The concepts behind UDL encourage instructors to create flexibility and choice in their courses to the maximum extent possible so that unintended barriers to learning can be avoided or diminished.

UDL requires instructors to reflect on questions (M. Flood 2021) when planning for such as learning, teaching, assessment, and student success:

1. Why should our students care about the learning goal in front of them?

*(engagement)*

2. How can students build their understanding of the learning goal in front of them, and how are we supporting this? *(representation)*

3. What options are we providing for our students to truly communicate and demonstrate their knowledge, understanding, skills and values? *(action and expression)*

If educators use the UDL guidelines to help them address these questions, then they should see improved student outcomes. But, like all endeavours, this takes time.

## 12. Terminology

Term	Description
<b>Disability</b>	An umbrella term for impairments, activity limitations and participation restrictions. Denotes the negative aspects of the interaction between an individual (with a health condition) and that individual's environmental and personal context.
<b>Health condition</b>	A disease that is short or long lasting; an injury (e.g. sustained in an accident); mental or emotional problems, which may range from stress due to day-to-day problems of living to more serious forms of mental illness; or problems with alcohol or drugs
<b>Functioning</b>	An umbrella term for body functions, body structures, activities and participation. Denotes the positive aspects of the interaction between an individual (with a health condition) and that individual's environmental and personal context.
<b>Body Functions</b>	Physiological functions of body systems (including psychological functions).
<b>Body Structures</b>	Anatomical parts of the body such as organs, limbs and their components
<b>Impairments</b>	Problems in body function and structure such as significant deviation or loss
<b>Activity</b>	The execution of a task or action by an individual
<b>Participation</b>	Is involvement in a life situation
<b>Activity limitations</b>	Difficulties an individual may have in executing activities
<b>Activity limitations</b>	Problems an individual may experience in involvement in life situations.
<b>Barriers or hindrances</b>	External factors in a person's environment that, through their absence or presence, limit functioning and create disability. Includes aspects such as an inaccessible physical environment; lack of relevant assistive technology; negative attitudes of people towards disability; and services, systems and policies that are lacking or that hinder the involvement of all people with a health condition in any area of life.
<b>Facilitators</b>	Factors in a person's environment that, through their absence or presence, improve functioning and reduce disability. Includes aspects such as an accessible physical environment; availability of relevant assistive technology; positive attitudes of people towards disability; and services, systems and policies that aim to increase the involvement of all people with a health condition in all areas of life. Absence of a factor can also be facilitating (e.g. the absence of stigma or negative attitudes). Facilitators can prevent an impairment or activity limitation from becoming a participation restriction, since the actual performance of an action is improved, despite the person's problem with capacity.
<b>Contextual factors</b>	The complete background to a person's life and living, including external environmental factors and internal personal factors.
<b>Environmental factors</b>	Contextual factors that include the background of a person's life and living, composed of components of the natural environment (weather or terrain); the human-made environment (tools, furnishing, the built

	environment); social attitudes, customs, rules, practices and institutions, and other individuals.
<b>Environmental factors</b>	Contextual factors that include the background of a person's life and living, composed of components of the natural environment (weather or terrain); the human-made environment (tools, furnishing, the built environment); social attitudes, customs, rules, practices and institutions, and other individuals.
<b>Personal factors</b>	Contextual factors that include the background of a person's life and living, composed of features that are not part of a health condition or disability. Includes age, race, gender, educational background, experiences, personality and character style, aptitudes, other health conditions, fitness lifestyle, habits, upbringing, coping styles, social background, profession, and past and current experience.
<b>Assistive Technology</b>	Any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities. Examples of Assistive Technologies include wheelchairs, prostheses, hearings aids, visual aids, and specialized computer software and hardware that increase mobility, hearing, vision, or communication capacities.

### 13. Bibliography

- Adams, M. & Brown, S., 2006. Towards inclusive learning in higher education: Developing curricula for disabled students, London: Routledge.
- Ahmad, F.K., 2015. Use of Assistive Technology in Inclusive Education: Making Room for Diverse Learning Needs. *Transcience*, 6(2).
- Ahn, M.Y. & Davis, H.H., 2020. Students' sense of belonging and their socio-economic status in Higher Education: A quantitative approach. *Teaching in Higher Education*, pp.1–14.
- Batty, L. & Reilly, K., 2022. Understanding barriers to participation within undergraduate stem laboratories: Towards development of an inclusive curriculum. *Journal of Biological Education*, pp.1–23.
- Bunbury, S., 2018. Disability in higher education – do reasonable adjustments contribute to an inclusive curriculum? *International Journal of Inclusive Education*, 24(9), pp.964–979.
- CAST 2018: Universal Design for Learning Guidelines version 2.2. Retrieved from <http://udlguidelines.cast.org>
- Castellana, M. & Ingrid Sala-BarsMontserrat Castellana, I.S.-B., 2006. Estudiantes con discapacidad en la universidad: cómo atender esta diversidad en el aula. *Prevención Risc Escolar S.L.*
- D.Shaewitz & J.R. Crandall, 2020: Higher Education's Challenge: Disability Inclusion

on Campus, <https://www.higheredtoday.org/2020/10/19/higher-educations-challenge-disability-inclusion-campus/>

- Edyburn, D.L., Higgins, K. & Boone, R., 2005. Handbook of Special Education Technology Research and practice, Whitefish Bay, WI: Knowledge by Design.
- Goddard, M., 2004. Access through technology. Library Journal, 2, pp.2–6.
- G. Kouroupetroglou and A. Pino 2022: “Developing Training Tutorials by UoA”, Edu4ALL “Disability as diversity: The inclusion of students with disabilities in higher education” Deliverable 2.5.1, 2022.
- Holloway, S., 2001. The experience of higher education from the perspective of disabled students. Disability & Society, 16(4), pp.597–615.
- Hopkins, D. & Stern, D., 1996. Quality Teachers, Quality Schools: International Perspectives and policy implications. Teaching and Teacher Education, 12(5), pp.501–517.
- Hopkins, L., 2011. The path of least resistance: A voice-relational analysis of disabled students’ experiences of discrimination in English universities. International Journal of Inclusive Education, 15(7), pp.711–727.
- Hornby, G., 2014. Teaching children with a wide range of special needs and disabilities. Inclusive Special Education, pp.41–59.
- J. TAI ET AL, 2022, How are examinations inclusive for students with disabilities in higher education? A sociomaterial analysis, 2022, <https://doi.org/10.1080/02602938.2022.2077910>
- K. Riviou, G. Kouroupetroglou and A. Bruce 2014: “UDLnet: A Framework for Addressing Learner Variability”, Proceedings of the International Conference on Universal Learning Design, Paris, 9-11 July 2014, vol. 4. ISSN 1805-3947, pp. 83-93.
- K. Riviou and G. Kouroupetroglou 2014: “Designing an educational scenario using the principles of Universal Design for Learning”, The 14th IEEE International Conference on Advanced Learning Technologies - ICALT2014, July 7-9, Athens, 2014
- Katz, Jennifer & Mirenda, P., 2002. INCLUDING STUDENTS WITH DEVELOPMENTAL DISABILITIES IN GENERAL EDUCATION CLASSROOMS: EDUCATIONAL BENEFITS. International Journal of Special Education, 17(2).
- Kraska, M., 2003. Postsecondary Students with Disabilities and Perceptions of Faculty Members. Journal for Vocational Special Needs Education, 25, pp.11–19.
- Lane, L., 2017. ‘Am I being heard?’ The ‘voice of’ students with disability in higher education: A literature review. European Action on Disability in Higher Education (EADHE).

- M. Flood 2021: Margaret Flood, IRELAND'S EDUCATION YEARBOOK 2021. An Introduction to Universal Design for Learning (UDL)
- Meyer, A., Rose, D.H., & Gordon, 2014: Universal design for learning: Theory and Practice. Wakefield, MA: CAST Professional Publishing.  
[http://udloncampus.cast.org/page/udl\\_about](http://udloncampus.cast.org/page/udl_about)
- Morgan, H. & Houghton, A.-M., 2011. Inclusive Curriculum Design in Higher Education: Considerations for effective practice across and within subject areas. The Higher Education Academy, York. .
- Moriña, A., Cortés, M.D. & Melero, N., 2013. Inclusive curricula in spanish higher education? students with disabilities speak out. *Disability & Society*, 29(1), pp.44–57.
- Moswela, E. & Mukhopadhyay, S., 2011. Asking for too much? the voices of students with disabilities in Botswana. *Disability & Society*, 26(3), pp.307–319.
- Mrodriguez 2010: Center for Parent Information and Resources Accommodations in Assessment for Students with Disabilities, A legacy resource from NICHCY 2010  
<https://www.parentcenterhub.org/iep-assessments/>
- Petty, R.E., 2005. Technology Access in the Workplace and Higher Education for Persons with Visual Impairments An Examination of Barriers and Discussion of Solutions. Independent Living Research Utilization The Institute for Rehabilitation and Research.
- Pivik, J., McComas, J. & Laflamme, M., 2002. Barriers and facilitators to Inclusive Education. *Exceptional Children*, 69(1), pp.97–107.
- Pozo,, J.I. & Monereo., C., 2006. “Introducción: La Nueva Cultura Del Aprendizaje Universitario O Por Qué Cambian Nuestras Formas de Enseñar y Aprender.” In *Psicología del Aprendizaje Universitario: La Formación en Competencias. La Formación en Competencias*.
- Prince 2021: Prince George's Community Colleg, UDL-aligned strategies, 2021  
<https://pgcc.libguides.com/c.php?g=853584&p=6346380>
- Shaewitz , D. & Crandall, J., 2020. Higher Education's Challenge: Disability Inclusion on
- Smith, R.W., 2011. Inclusive and special recreation: Opportunities for persons with disabilities, Sagamore Pub.
- Stapleton, L. & James, L., 2020. Not Another All White Study: Challenging Color-Evasiveness Ideology in Disability Scholarship (Practice Brief). *Journal of Postsecondary Education and Disability*.
- SUTTON-Long, C. et al., 2016. CO-DESIGN FOR COMMUNITY INCLUSION. Huddle.
- Svendby, R., 2020. Lecturers' teaching experiences with invisibly disabled students in higher education: Connecting and aiming at inclusion. *Scandinavian Journal of Disability Research*, 22(1), pp.275–284.

- UNESCO (1994): The UNESCO Salamanca Statement and Framework for Action on Special Needs Education. UNESCO, Paris.
- Uni. of Sun. 2012. University of Sunderland, Examination & Assessment Procedures for Disabled Students and Students with Specific Learning Difficulties Oct.2012, pp. 8-11
- Uni. of Roch. 2022: University of Rochester, 2022,  
<https://www.rochester.edu/college/disability/faculty/universal-design.html>
- Uni. of Aber. 2018 University of Aberdeen, Guidance on Assessment for Students with Disabilities and Special Circumstances: Who is this guide for? Version 2 2018, pp 2-8
- Warger, C. (1998): Integrating Assistive Technology into the Standard Curriculum. ERIC/OSEP Digest E568.
- Wessel, R. et al., 2009. Retention and Graduation of Students with Disabilities: Facilitating Student Success. Journal of Postsecondary Education and Disability, pp.116–125.
- WHO, 2009. Assistive devices/technologies. Available at: <http://www.who.int/disabilities/technology/en/> [Accessed March 12, 2022].
- Zygouritsas 2015: Nikos Zygouritsas, Pathway to Universal Design for Learning, 2015 <http://www.udlnet-project.eu/sites/default/files/Quick%20reference%20card%20%28Aug%202015%29.pdf>. from NICHCY 2010