

How can we make teaching more inclusive?

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Abstract—Diversity among university students has increased, but students with disabilities still get support on a case by case basis, forcing them to display their disability to teachers and peers. An approach that is less stigmatising, focusing on making the university more inclusive for all students, is Universal Design for Learning (UDL). A related approach is Universal Design (UD), with its focus on design for all people, instead of for people in need of special solutions. A pilot study at the faculty of engineering at Lund University (LTH) in 2017 showed that, while LTH has good support for students, more support for teachers is needed, as well as more focus on inclusion. We now present our own efforts to apply UD and UDL in our teaching, and some suggestions from students regarding how we together can make teaching and learning more inclusive at LTH.

Index Terms—higher education, inclusion, teaching, universal design, universal design for learning

I. INTRODUCTION

SWEDISH university students are increasingly diverse [1, 2]. They have a multitude of backgrounds, experiences, previous knowledge, learning styles and abilities. Many also have some kind of disability that make their studies more challenging, for instance regarding physical access, tutoring and examination [3]. Most of these students never inform their teachers or seek the pedagogical support that is available, leaving them to struggle on their own.

The model that is currently adopted by most universities, is to support students with disabilities on a case by case basis, forcing the students to display their disability to teachers and peers. An approach that is less stigmatising, focusing on making the university more inclusive for all students, is Universal Design for Learning (UDL) [4, 5, 6, 7]. UDL focuses on increasing the flexibility of how students can take in information, express their knowledge and be motivated in learning, thereby reducing the need for special adaptations. A related approach is Universal Design (UD), with its focus on design for all people, instead of designing special solutions for separate target groups [8, 9].

In 2017 we set out to learn more about diversity and inclusion at LTH, through interviews with key persons at different levels of the organisation, focusing on their views and experiences regarding students with disabilities [10]. We learned that, while LTH has good support for students, more support for teachers is needed, as well as more focus on inclusion. This led us to, among other things, strive to

apply UD and UDL in our own teaching, and to ask students for their input regarding inclusion at LTH.

II. METHOD

The seven principles of Universal Design [8], were tentatively applied to the elective online course “Design of Everyday Cognitive Support” (DECS), for the fall of 2018. The course is using Moodle as a Virtual Learning Environment (VLE), and is led by the first author. We looked for features of the course that seemed to support each of the seven principles. We also briefly considered the UDL guidelines to provide multiple means of engagement, representation, action and expression.

A second approach was to ask students how teachers may make their lectures more inclusive. A class of students in an elective course in rehabilitation engineering, were in the fall of 2017 asked to consider students with visual impairments and/or dyslexia, while noting the presentation methods used by the teachers in the lectures they attended that semester. They were specifically asked to look for features that might create obstacles for these students, to give suggestions regarding what the teachers might do to make it easier for the students to take part in the lectures, and what technical and human support the students might benefit from. Their findings were reported as part of an examination assignment. We have yet to analyse the results, but present some of the suggestions from the students regarding inclusion of students with dyslexia.

III. RESULT AND DISCUSSION

A. The seven principles of UD applied to a course

This is what we found when we applied the seven principles of Universal Design to the online-only DECS course:

Principle 1, Equitable use. To make the VLE and its content as accessible as possible, and to make all students feel equally welcome [11], we use the VLE Moodle for the course. Moodle has been judged to be more accessible than other platforms that are currently available at LTH [12].

Principle 2, Flexibility in use. Moodle is accessible from computers with different operating systems and web browsers, as well as from tablets and smartphones. The students may often choose among different takes on the topic at hand and consider what is relevant to them and their situation. This is also in line with the UDL guidelines [7]. The students have a choice, within an interval, in how many words to write and a choice of optional, additional content. Much of the content is presented in text, but video is increasingly used as a complement. Also, text is the preferred way to complete most assignments, but if the students opt to use video or PowerPoint, they may write fewer words.

Principle 3, Simple and intuitive use. At the start of the

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course, the students get a short, comprehensive overview of all the course modules, and all course modules have the same organisational structure. In some modules, written summaries of the core content are provided. All mandatory reading is in Swedish.

Principle 4, Perceptible information. To make the content perceptible also to students with vision, hearing or reading problems, it is important to provide multiple formats. Here all text is formatted to be possible to access with a screen reader, which is available to all students through the university library. Many, but not all video files have subtitles.

Principle 5, Tolerance for Error. The students may ameliorate their assignments, if they are originally not approved. It is however not always possible for students to remove a post from the VLE, once it is there.

Principle 6, Low physical effort. This is an inherent feature of an online course.

Principle 7, Size and space for approach and use. Placements of texts and links are spaced to minimize erroneous clicks.

That the DECS course is given 100% online, makes some of the accessible features inherent to the course, such as the possibility for students to study at their own pace and in their own time.

Some features are also inherent to the VLE, in this case Moodle, while it is up to the teacher to design the course modules within the limitations that the VLE provides, and give it a structure that is easy for the students to understand and follow. Even if Moodle is said to be more accessible than many other VLEs, it is the authors' experience that there is a demand for initial instructions about how to use Moodle for new students. Here principle 3 (simple and intuitive use) and 5 (tolerance for error) highlight most of the limitations.

When it comes to principle 4 (perceptible information) it is up to the teacher to make sure that all pdf-files are possible to access with a screen reader/listen to with synthetic speech, so that they don't consist only of pictures of the content. It is fairly easy to make pdf-files that are accessible for students with dyslexia and other neuropsychological impairments, who can see the text and highlight what they want to listen to. It takes more effort and knowledge to make a pdf fully accessible also for blind students, and not all pdf's in the DECS course meet this standard. Also, more and more content is flexible, so that not everything is text. While videos that are provided by UR Skola and UR Play already include subtexts, it takes some effort and ingenuity to provide alternative access to videos you have created yourself. Thus, not all videos that are provided in the DECS course are fully accessible yet.

Principle 2 (flexibility in use) is the one that is most in line with UDL, which is focusing specifically on learning, instead of Universal Design as a more general concept. Both UD and UDL provide frameworks for thinking about inclusion, and how to achieve it. If you view them as processes towards that end [13], it may feel less daunting for you as a teacher to try to apply them, knowing that it is neither necessary, nor desirable to try to do everything at once. That said, checking the DECS course against the seven principles of UD felt like an exercise that was worth

the while, showing us that we are on the right track and that easy solutions may go a long way. It is however also important to acknowledge the complexity of implementing UDL in its entirety, as is thoroughly explained by Edyburn [14], who also stresses the need for technical design solutions. This has been further developed in a new model called "Design for more types", focusing on universal design engineering [15], an approach that might prove to be very useful at a faculty like LTH.

B. Recommendations from students

The suggestions presented here come from students who have stated that they themselves have experience of dyslexia, or have talked to other students at LTH with dyslexia (present or graduated). The result is presented as recommendations regarding how teachers can make their lectures more inclusive.

- 1) **Make sure that course books also are available as audiobooks.** Some students with dyslexia choose not to read, or to read very little, because reading takes too long time and too much energy. Instead they listen to text through audiobooks, or through selecting digital text and making a speech synthesizer read it for them.
- 2) **Don't change the required reading,** as specified in the syllabus. If a book is not already available in an accessible format, students with reading difficulties have to order it in a format they can access and use, and it may take several months before they get it.
- 3) **Make PowerPoints and notes** of text and calculations that get written on the blackboard **available before the lecture.** This makes it possible for students to prepare by reading it through beforehand without stress. During the lecture they may then concentrate on what the lecturer is saying.
- 4) **Say what you write on the blackboard,** so the students may focus on listening and taking notes.
- 5) **Speak more slowly during the lecture,** and make pauses so more students have time to take notes. Most teachers speak too fast. It is difficult for students to listen to the teacher and make sense of what is said, while they are at the same time trying to read what is written on the blackboard and copying it to their notebook. It may be difficult for anybody, but it may be impossible for students with dyslexia. Getting support through notes from other students doesn't always work, because students (also with dyslexia) may need to try to write down the notes themselves to keep up.
- 6) **Record lectures** and make them available to the students afterwards, when they can listen in their own pace. It is not possible for students to keep their focus at 100% throughout a whole lecture.
- 7) **Don't give students new text-based material during the lecture** and expect the students to read it during five minutes, and then discuss it in groups or with the whole class. Give the students this material before the lecture, so they can read it in their own pace in a safe environment, and then be able to take part in the discussions.
- 8) **Provide oral briefings for laboratory work,** instead of making the students read through long, text-based lab briefs that are difficult to read, or try to describe the lab

with pictures instead of a lot of text.

- 9) **Don't have too much text in PowerPoint presentations**, and structure them well. Use the presentations to simplify, with carefully selected main points and illustrative pictures.
- 10) **Provide practical examples**, to give the students other insights into how things work and tie in to each other.
- 11) **Provide many example assignments** that make it easier to understand.
- 12) **Show relevant experiments**, and let the students hear the teacher explain while they observe what is happening. If the subject is more theoretical, show pictures and/or video instead.
- 13) **Exercises are often not long enough** for the students to keep up, so students with dyslexia often miss out on opportunities to ask questions.
- 14) **Have a final lecture that is based on questions from the students**, at the end of each course.
- 15) **Consider alternatives to written examinations**, which are huge obstacles for students with dyslexia, even if they get longer time for the examination. Written examinations may give the wrong impression of how much somebody understands of the content of a course. It may be hard for students to express themselves and they may misunderstand the questions.

Most of the recommendations summarized above will benefit all students. In her book "Undervisa tillgängligt!" (Eng. "Make your teaching accessible!") Ann-Sofie Henriksson [16] confirms the need for students with dyslexia to have text material sent out in advance. Henriksson also states that students with dyslexia, as well as other students, benefit from a wide variety of pedagogical strategies.

From the teachers' points of view, it could be time consuming to prepare lectures and update the corresponding PowerPoint presentations a week before each lecture to make them available to the students in advance, since the teachers then might need to do a second preparation of a lecture the day before each lecture. A solution to this problem could be to make last years' presentations available from the beginning of the course, including information that they are preliminary versions. Then the teachers only need to prepare the lectures once and the updated presentations can be available immediately before or after each lecture.

IV. FINAL THOUGHTS

For teaching to become more inclusive, Universal Design and Universal Design for Learning might provide useful tools to support this process. It may also prove crucial to involve both teachers, students and support structures at different levels of the university to achieve this goal. We have to strive towards doing it right from the start, and not forget the small measures that might have vast outcomes. That said, we can't allow ourselves to let the best be the enemy of the good, but instead acknowledge that doing something is always better than doing nothing.

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