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Terhi Kärpänen, Outi Loikkanen & Kaisa Puttonen (eds.)

LIFE - Learning Is for Everyone **Universal Design for Learning in practice**



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1 Learning is for everyone

Kaisa Puttonen

LEARNERS NEED A wide range of support at all levels of education to keep up with their studies. Even if a learner does not have actual learning difficulties, they may have lost their motivation and find it hard to commit to their studies. Even if they have no problems with their studies, everyone is an individual and offering options encourages them to make the most of their potential. Designing the learning process to be optimal for as many people as possible benefits everyone.

This collection of articles is related to a learning design framework that increases equality: Learning is for everyone (LIFE) wheel of design. It is based on the Universal Design for Learning (UDL) framework, which also increases equality in learning. The aim of this collection of articles is to elaborate on the background of the LIFE wheel of design and to highlight equal and accessible teaching. The wheel of design is a practical tool. [*The workbook*](#) for implementing the wheel is available online.

The Universal Design for Learning (UDL) framework aims to create equal opportunities for everyone to learn and to be successful. The neuroscience-based framework removes obstacles related to learning. According to UDL, these obstacles are caused by the learning environment, not by the characteristics of an individual. Obstacles to learning are removed by activating areas of the brain related to why, what, and how to learn. Learners process information in different ways and at different paces, their ways of working and interacting are different, and they bring their knowledge bases as well as experiences with them to learning situations. UDL is a practical approach because it offers concrete methods to apply in teaching. As described in the article "*Universal Design for Learning (UDL) and examples of how to put it into practice*", UDL can be applied to an entire course or a single lesson, also to both contact and online teaching.

LIFE WHEEL OF DESIGN

Using the LIFE wheel of design makes it possible for teachers to design their teaching to suit as many learners as possible and take accessibility into account. The wheel is applied to goals, assessments, methods and learning materials. The design of removing obstacles to learning is based on accessibility and diversity, that is, on the provision of alternatives. The principle “**why should I learn**” offers options for ensuring commitment to learning, “**what am I studying**” introduces different means of presenting information and “**how am I studying**” provides alternatives for action and expression. The practical ways of applying UDL guidelines included in these principles are layered in the design and implementation of teaching.

Motivation is essential for learning. This topic is discussed in the article “*How to ensure the learners’ engagement in teaching?*” Cognitive accessibility is involved in different stages of the wheel of design. This is examined in the article “*How to take cognitive accessibility into account in teaching materials*”. Both of these articles elaborate on the principle “why should I learn”. The article “*Multiple means of action and expression in teaching*” relates to the principles “what and how am I studying”. The final article “*Student-centric teaching through Service Design*” introduces a practical example. It describes how students develop during a service design project tools that support the UDL principles.

The LIFE wheel of design is a whole that starts with general learning outcomes and progresses through practical implementation to the evaluation of one’s teaching. It is important to be consistent with the goals, assessment, methods, and materials throughout the whole. The wheel of design utilizes so-called backward design. Backward design defines learning experience as a process with three steps: first a teacher establishes clear learning outcomes, then designs assessment methods, and finally designs the instructional experience. Different learners are taken into account in all three stages. The strength of backward design is that the intended outcomes affect all other decisions during the design process. (Black & Moore 2019.) The wheel of design has six sections in which these stages are included. It should be noted that the wheel of design can complement and bring new perspectives to the teacher’s current way of planning.



Figure 1. Learning is for Everyone (LIFE) wheel of design (Kärpänen, Loikkanen & Puttonen 2023). (Based on Rao, 2016).

In the first section of the design wheel, the task is to check whether the learning objectives of one's own teaching are compatible with the general objectives of the organization. The learning objectives of basic and upper secondary education have been recorded in the national curricula, which are applied on a school-specific basis.

The second section is where a teacher modifies the learning objectives of their own teaching so that it is easy to understand and the learners identify the key concepts and skills they should master. At the same time, the teacher identifies possible obstacles to learning and takes the diversity of learners into account. Typical obstacles include over-long sections, too little time for reflection or content that is unconnected to the learners' own experiences.

The third section consists of thinking about different ways the learners can demonstrate their skills. Assessment and objectives are closely connected. Diverse ways are suited to both formative and summative assessment. The learners are clearly informed of what is expected of them, regardless of how they demonstrate their skills. A rubric is a good tool for this, as it contains the contents of the study entity and what skills are required.

In the fourth design section, the teacher decides on their teaching methods and identifies different ways of supporting the learning process. This section is about ensuring that learners have alternative and motivating ways of progressing in their learning. Learning support can be available throughout the course, such as a discussion forum for questions, or it can be additional support that the teacher schedules to best fit the course content.

In section five, the focus is on designing diversified learning material that provide alternatives for understanding the content. The accessibility of the learning material must be ensured. For example, videos must be subtitled, and images or graphs must have text captions. The diverse learning materials of the course must be closely connected to the teaching method and support learners to achieve the learning objectives.

The final, sixth stage of the wheel of design includes reflecting on and revising the course. Feedback is first mentioned at this section, but feedback from learners is an important part of the entire teaching process. Feedback from different sections can be used in this stage to shape the study entity before its next implementation. Teachers can also collect feedback in diverse ways.

LIFE WHEEL OF DESIGN – PART OF A PROJECT

The LIFE wheel of design has been used in the 2022–2023 project Learning is for Everyone (Oppiminen kuuluu kaikille) funded by the Finnish National Agency for Education. The project goal was to teach the UDL guidelines to teachers at upper secondary level and have them apply the LIFE workbook to their own teaching. Based on the feedback, the participants found new perspectives on developing their own teaching and ways to respond to the challenges of diverse learners and inclusion with the help of the wheel of design. One advantage mentioned was that a teacher can start with something small and use the wheel of design to try the UDL from their own starting point.

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2 Universal Design for Learning (UDL) and examples of how to put it into practice

Kaisa Puttonen

U **NIVERSAL DESIGN FOR** Learning (UDL) is a framework for accessible teaching that ensures equal opportunities for all learners to succeed in their studies. The origins of UDL are in building architecture and technology development. The main idea of universal architecture is to have accessible spaces and environments so that everyone is able to use them.

Center for Applied Special Technology (CAST) applied the Universal Design approach to education. CAST is a non-profit organization established in 1983. Inspired by technological developments in the early 80s, the aim was to explore ways of providing better learning experiences to learners with disabilities. Little by little, they came to an understanding of a new approach to education that removes obstacles to learning from as many people as possible. Obstacles were perceived as part of a learning environment instead of something inherent to learners' characteristics. The learning environment's design and implementation can exclude learners.

UDL was created gradually through development and research. The end result is a framework that explains why, what and how to learn. In 1998, CAST introduced the principles of UDL to the Council for Exceptional Children. At the same time, a topical brief called 'Design Principles for Student Access' was published. The brief is considered to be the first actual text discussing the UDL framework. The framework has been updated during the years with the latest version published in 2018. (Garrad & Nolan 2023; CAST.)

PRINCIPLES OF UDL

The framework has three main principles for activating the brain. The principles contain 9 guidelines that have a total of 31 checkpoints (table 1). The principles are (Boothe & al. 2018; Almeqdad & al. 2023; CAST):

1. Providing multiple means of engagement and motivation, which activates the affective networks in the brain – the “why” of learning (Engagement).
2. Providing multiple means of representation of content, which activates the recognition networks in the brain – the “what” of learning (Representation).
3. Providing multiple means of action and expression, which activates the strategic networks in the brain – the “how” of learning (Action & Expression).

The UDL framework is based on cognitive neuroscience. By activating different areas of the brain we can produce learning experiences and interaction situations. When there are multiple means of providing these, everyone has the opportunity to learn in a way that suits them. This creates a proactive whole with the purpose of anticipating the learners’ needs.

UDL is a practical framework. Parts of it can be gradually introduced and tested in one’s own teaching in a suitable context. Through these tests, teaching will be gradually shaped to be accessible to as many people as possible. The ultimate goal is for the educational institution to officially include the UDL framework in their curriculum. This has happened in the United States, for example. (Tobin & Behlin, 2018, 24-26.) In over thirty years, UDL has gained popularity globally as a framework for education at different educational levels to remove obstacles to learning from diverse learners while increasing their motivation and participation.

UDL is a comprehensive framework for education that includes the design of teaching objectives, methods, materials and assessment. In addition to removing obstacles from teaching, it helps learners to become independent and take responsibility for their own learning. (Garrad & Nolan 2023; CAST.) The application of UDL principles ensures that the learner experiences learning successes and is able to be an active participant in education (Almeqdad & al. 2023).

The full description of the framework is available on CAST website; this article does not discuss the details of the framework. The visual presentation of the framework is attached at the end of the article.

The following examples from research articles explain how the UDL framework has been used in teaching and what kinds of results have been obtained. The goal of the examples is to give the reader an idea of how to apply the UDL principles and ideas to their own teaching.

UDL FOR A SINGLE COURSE

Student engagement and satisfaction through UDL on an online course

A study by Garrad and Nolan (2023) examined how UDL elements affect students’ engagement and satisfaction in an online course. They tested the effects with 107 teacher students. The researchers compared two groups: the online course for one group included elements of the UDL and the course for the other group did not. They compared the use of the learning environment by monitoring log files, such as login times. The students also assessed their learning after each study entity. The aim was to obtain information on how the diverse learning material and elements, which were incorporated into the online unit design, affect the learning experience.

Students in the first group only received a recorded video of the lecture to watch in advance. For the students of the second group, the materials were diversified. In addition to the recorded lecture, the students also had access to short videos explaining key concepts, with the videos including visual elements such as graphs. The students were able to download lecture slides and scripts in Word and PDF formats. The video was subtitled and then compressed, which made downloading easier. The lecture was also available in audio format.

Engagement was supported by adding options to the pace of studying. The use of the online learning environment is independent from time, place, and device. Students were able to plan a study pace that best suited themselves. After each topic module, a hurdle quiz required seven correct answers out of ten. After the required number of correct answers, the student gained access to the next topic module. This self-assessment ensured the student that they had learned the key things. The quizzes did not affect the final grade.

Also, alternatives motivated students to complete their tasks. Previously, students wrote two essays on given topics. Now students were able to choose the most interesting theory of psychology from four different options and then apply it to an educational environment (e.g. early childhood education and care or upper secondary level) of their choosing. They could submit the assignment as an essay, a PowerPoint presentation, or a recorded oral presentation.

The results clearly showed that linking UDL elements to the course resulted in a significant increase in student engagement and satisfaction with the course, as well as in reduced student attrition. Students appreciated different options, ability to self-pace, and felt that they had were in control of their own learning processes. For example, the rating given to the statement "The learning materials were useful" rose from 3.64 to 5.00 on a scale of 1–5. The researchers pointed out that digitalization provides a wide range of opportunities for presenting the learning materials so that they are accessible to everyone.

Student engagement and satisfaction through UDL on a blended learning course

Kumar & Wideman's article (2014) discusses the impact of UDL on a blended course implementation with teaching provided both online and in a classroom. The article examines a health science course from the perspectives of the instructor who has taught the course for four years and a support services counsellor. UDL principles have been gradually incorporated in the course offering over the years. The results are like those of the Garrad & Nolan (2023) study.

Kumar also provided support for the students' preparation through diverse learning materials in the course, just like Garrad and Nolan (2023). Before the first online lesson on Kumar's course, the students received the instructor's PowerPoint presentation and a corresponding PDF file: a study guide that included, among other things, a detailed point-form outline of the entire topic and a list of key concepts. The learning platform had a discussion forum, where the students could get to know each other before the course. One week before the course began, the students received a welcome email. The message included a request to complete a student profile, which provided the instructor with information about the students' individual needs and interests before the course starts.

During weekly in-class sessions, the information was provided through a variety of methods, for example, volunteer students gave hands-on demonstrations and guided practical exercises to their peers. The subtitling of a microbiology video made it easier to understand the topic. Small group discussions in the classroom and online discussions increased interaction. The instructor responded quickly to online questions. The assessment criteria were expressed in text form and in a rubric, in other words a chart presenting the contents and learning objectives of the study entity. The instructor provided examples of assignment submission options.

For example, a poster assignment included both visual and written instructions on how to create a poster, as well as an example of a finished poster and its written response.

Students were able to demonstrate their skills in various ways. They could choose from several questions and, for example in basic chemistry, they could demonstrate their competence by providing chemical equation or by verbal explanations. One of the tasks was to submit their lesson notes either as a printout or to the online platform. This allowed students to use, for example, only chemical equation, only text, or a combination of these. The study unit included a written report. This was first discussed in the group and the students selected the topic and the deadline for the report. They were then allowed to decide whether to complete the task individually or in a group. The oral presentation was a joint one. The final exam could be taken either by completing 1–4 shorter assignments, each of which cut one section from the final exam, or by completing all the sections in the final exam.

At the end of the semester, 50 students were asked to provide feedback on the course. According to this study, the students also felt that a course based on the UDL model offered better control of their own studies than on previous courses and reduced stress. The most significant factors affecting the learning experience were the ability to choose the submission date, method of working or method of taking the final exam. Having advance access to materials used in teaching had a significant impact on learning as well.

Kumar interviewed four students about the accessibility of the course containing UDL elements. The interviews confirmed the factors already mentioned that promote learning: the flexibility of studies and having different options, sense of community, less stress and greater success in studies.

LITERATURE REVIEWS ON THE APPLICATION OF UDL

The studies introduced before are examples of applying UDL to one course. Literature reviews reveal similar phenomena more widely than on individual courses.

Applying UDL to higher education

Booth & al. (2018) have prepared a literature review, the articles of which cover the application of the UDL principles to higher education. They identified themes related to the UDL principles from studies and presented practical measures related to them. The identified themes are in bold.

Four themes related to the UDL principle of “providing multiple means of engagement” (the “why” of learning) were identified from the articles. First of these themes is **fostering collaboration**. This means that variation in online discussions increases participation. Discussion groups can be shared by everyone, between faculty and a student, or between students. Using the “Ask 3” method, the students are instructed to first ask three different peers for help before reaching out to the professor. Online discussion requires clear instructions about how a discussion progresses and how topics are handled.

The second theme is **alternative accessible content sources**. Enlarging texts, changing background colours and live subtitling during PowerPoint presentations were used in teaching situations. According to the literature review, also the third theme, **scaffolding**, increases engagement and motivation. This involves offering the materials to be learned in smaller segments. This makes it easier for students to work on mobile devices and for instructors to update their teaching materials, for example. To support learning, a student must be given enough time to absorb new information and the accessibility of technology must be ensured. The fourth theme related to engagement identified from the articles is **be easily accessible**. This means that

the students are offered effective channels of contacting the faculty members, they know the times when the instructors are available and are aware of their respond time.

In the literature review concerning higher education by Booth & al. (2018), five themes were identified relating to the second UDL principle of “providing multiple means of representation” (the “what” of learning). The first identified theme is **providing multiple formats of course content**, such as using subtitling and audio, interactive tasks and making use of social media. According to the articles, learners must be supported in comprehending the content so that they are able to perceive what they need to learn. This can be promoted by **highlighting critical information** in the learning materials, which is the second theme. The methods mentioned are summary lecture notes, color-coded notes, graphical summaries, checklists. Instructors also provide information about different tools and applications the students can use to structure the learning materials.

The next identified theme is **simple navigation**, which makes a course clear and easy to use. An organization-level agreement on using certain tools within the Learning Management System (LMS) increases the clarity. This creates the student a sense of continuity and safety in the use of the tools on different courses. Clarity also involves ensuring the accessibility of the course material. The fourth theme identified by the researchers is providing **feedback in various forms**. The feedback must be timed correctly, and its presentation can be varied – you can try audio or video, for example. According to the researchers, the final theme related to multiple means of representation is **presenting the course syllabus**. According to the articles, the objectives and assessment criteria must be presented to learners unambiguously. Examples of this include a rubric, summaries of the key components of the course, overviews of the weekly programmes for the entire semester, and clear expectations of what must be done.

The literature review found four themes related to the UDL principle of “providing multiple means of action and expression” (the “how” of learning). The first theme is **clarifying assignments** so that examples of previous assignments are provided, a rubric is available and submission dates are consistent. The articles also contain mentions of constructive assignment feedback given to students, which may come from the instructor or from peers. As far as peer feedback is concerned, students must be given sufficient time to make corrections before the final assignment submission.

The next identified theme is **discussion boards**. They are an important channel of interaction. The articles include examples about preparing instructions for the discussion, which contain a framework for discussing the topic and instructions on how the student should take notes on the discussion. The third and fourth article theme is the **flexible opportunities and choices**. The instructor sets the course goals and students may choose how to meet them. A wider perspective to this is that diverse assignment submissions have been approved in the practices of the faculty. The final theme related to the means of action and expression is **summative assessment**. It helps the instructor to find out what should be taught again. For example, a blog or other platform is set up for the students to record the things that are still unclear; understanding is ensured with questions at the end of the course or using an online multiple-choice questionnaire.

Booth & al. (2018) recommend the instructors to start applying UDL gradually, to experiment with something and, when satisfied, add new UDL elements. It is a good idea to start the changes with activities that feel discouraging in one’s own work. The authors of the literature review themselves were frustrated having to read essays submitted every week, and the students complained that because of having to write the essays, they do not have time to prepare for the next teaching session. The authors developed new ways of demonstrating learning at the end of each week, such as PowerPoint presentations that focus on introducing the topic to another student, writing a newsletter, writing a blog post to a specific target group, or a website.

UDL and technology

In their literature review, Bray & al. (2023) focus on identifying the ways teaching in accordance with the UDL principles is implemented in the upper secondary level using technology. While UDL is a technology-independent framework, it enables a pedagogical approach in which technology is used to reduce obstacles to learning. According to Bray & al. (2023), affordances of technology support pupils in completing assignments, planning what and how to learn (e.g. scheduling), comprehending the contents (e.g. mind maps), providing feedback and collaborating with other pupils. The articles examined in the literature review generally stated that technology provides diverse support for teaching. Bray & al. (2023) state that technology makes teaching and learning more inclusive for all learners.

According to the studies included in the literature review, the affordances of technology related to the UDL principle “what” of learning were used most to support and guide learners. The students were provided with tips for utilizing technology in learning and learning materials were made available on the learning platform. The tips covered, for example, how to use a browser reader extension, translation software or how to optimize your screen. The students were given a tip to read aloud the text they have written and then listen to their recording. Learning materials exported to the learning platform were similar to those in the studies introduced before, such as audio alongside text, a podcast or a subtitled video, visual information alongside text, and video games were also mentioned.

Engagement through technology was well represented in the articles examined in the literature review. They included the tool already mentioned above, i.e., providing alternatives. These articles also found that options increase engagement in learning. Students are able to choose how to do things according to their own strengths and needs. The articles reflect that the timely feedback and support enabled by technology could lead to higher levels of comprehension, self-assessment and reflection.

In the literature review by Bray & al. (2023), studies referred least to technology under the UDL principle of “multiple means of action and expression” (the “how” of learning). Examples of this principle included guiding students to make videos, blogs, and PowerPoint presentations to demonstrate their skills. Students were also given sentence-starters to ease writing or the problems to be solved were scaffolded according to the level of difficulty.

CONCLUSION

According to Garrad and Nolan (2023), Kumar and Wideman (2014) and Bray & al. (2023), the integration of UDL elements into a course significantly increases students' engagement and satisfaction as well as the feeling of being in control of their own studies, while it also reduces study pressures. Providing options and flexibility are key factors in all UDL principles, i.e. what, why and how of learning. Students' life situations are different, and when choices are offered it supports individual learning styles and time management. Another shared observation is that varied material given in advance, the possibility to prepare for lessons and a sense of community are factors that promote learning. Technology opens up many opportunities for diversity. However, using technology must be deliberate. Tools must be compatible with the learning environment and the student group, and the tools must support the learning objectives. Accessibility must also be ensured.

In general, the inclusion of UDL principles in teaching seems to have a positive impact on the learning experience. The impact is most effective when all three principles (why, what, how of learning) are involved in teaching. The principles work well together because they provide rich learning experiences and successes for

everyone. (Almeqdad & al. 2023). However, the studies lack perspectives that would deepen understanding of UDL. Studies related to technology focus on multiple means of presentation and the perspective of teachers. Studies should be expanded to include the students' experience of technology, how it supports self-directiveness, self-assessment and interaction in learning. (Bray & al. 2023.)

The teachers' perspective is also emphasized in the implementation of a UDL-based instruction, but measuring the benefits for students is missing (King-Sears & al. 2022). The studies also lack research into possible negative impacts, such as how technological tools increase cognitive loads (Bray & al. 2023). The literature review by King-Sears & al. (2022) noted that UDL is assessed positively, but they note that there has been no direct measurement of student learning outcomes. Garrad and Nolan (2023) also criticize the fact that studies focus on positive social and academic results. Almeqdad & al. (2023) note the need for conducting longitudinal research that examines the educational effectiveness of the UDL implementation from the training of teachers to the application of UDL in their own work.

The use of the UDL framework at different levels of education has been studied extensively. It can be said that, according to the current view, learners receive positive learning experiences and instructors receive positive teaching experiences (e.g. Kumar & Wideman 2014; Almeqdad 2023) when UDL is integrated into teaching. We are all individual learners, and the opportunity to use our own, individual learning styles is a great advantage in studying. Removing obstacles to learning through simple methods is in everyone's interest. UDL is an easy-to-apply learning design tool that every instructor can use in their own teaching. In the longer term, the goal could be to gradually increase the utilization of the UDL-framework in the educational institution, which would result to a general organizational teaching model promoting equality.

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APPENDIX 1.

A summary of the UDL guidelines. The original, more detailed framework is available at CAST website.

UNIVERSAL DESIGN FOR LEARNING GUIDELINES (CAST 2018)		
PROVIDE MULTIPLE MEANS FOR:	PROVIDE MULTIPLE MEANS FOR:	PROVIDE MULTIPLE MEANS FOR:
Engagement: The WHY of learning, affective networks	Representation: The WHAT of learning, recognition networks	Action & Expression: The HOW of learning, strategic networks
PROVIDE OPTIONS FOR:	PROVIDE OPTIONS FOR:	PROVIDE OPTIONS FOR:
Recruiting Interest	Perception	Physical Action
Sustaining Effort & Persistence	Language & Symbols	Expression & Communication
Self Regulation	Comprehension	Executive Functions
GOAL: EXPERT LEARNERS WHO ARE...	GOAL: EXPERT LEARNERS WHO ARE...	GOAL: EXPERT LEARNERS WHO ARE...
Purposeful & Motivated	Resourceful & Knowledgeable	Strategic & Goal-Directed

3 How to ensure the learners' commitment to teaching?

Terhi Kärpänen

UNIVERSAL DESIGN FOR Learning (UDL) framework takes all students into account already at the planning stage of teaching. UDL focuses on different learners and how to ensure their commitment to teaching. Everyone has a different way of learning, and it is important to understand the needs for teaching that increase the learners' intrinsic motivation. The UDL principle of engagement examines the meaning of learning and answers the following questions: Why should I learn? What motivates me to learn? This article discusses the characteristics of different learners and how the intrinsic motivation of different learners can be increased and taken into account in teaching and teaching design.

Universal Design for Learning (UDL) (Ahead 2017) takes all students into account in teaching and supports alternatives in teaching. It provides all learners with an equal opportunity to participate in teaching and also to learn, and supports the idea of inclusive teaching that takes all learners into account. Identifying different types of learners helps the teacher understand how to improve learning and teaching design.

Engagement is one of the UDL principles, and it starts from taking the needs of one's own learners into account. This principle supports the learners' engagement and motivation in various ways while ensuring the teaching is inclusive. An important method of engagement is to support learners' motivation (Pesonen & Nieminen 2021, 140). This article examines the characteristics of different learners and the UDL framework principle related to ensuring commitment to learning.

DIFFERENT OR DIVERSE LEARNERS?

According to the Finnish Diverse Learners' Association (Erialaisten oppijoiden liitto, 2023), 10–20% of the population have some kind of learning difficulties, and one in ten has a distinct learning difficulty. These can include difficulties in reading, writing, mathematics, learning foreign languages, using digital tools, motor



skills, conceptualization and concentration (Erialaisten oppijoiden liitto, 2023). Sarianna Reinikainen (2023), the Executive Director of the Finnish Learners Association, states in an article published in the magazine *KT-lehti* that learning difficulties have nothing to do with intelligence or the ability to learn. According to her, there are simply different ways of absorbing information.

Learning difficulties may also arise due to different situations in life. Illness, fatigue, medication or personal difficulties may temporarily make learning difficult. Feelings of nervousness and being the center of attention can also be challenging (Pesonen & Nieminen 2021, 51). Everyone may experience difficulties or obstacles to learning. Each of us can experience temporary difficulties or conditions that affect our learning during different stages of life. That is why, in this context, we can talk about diverse learners and take into account both permanent and temporary obstacles to learning.

By identifying different learners, we are able to influence the support provided for teaching, for example by using different ways and methods of teaching or tools to support learning. Different ways and methods of teaching may include gamification, group work, project learning or practical exercises. Tools to support learning may include reading and writing aids, such as text or speech recognition software. These methods and support tools help learners to cope with teaching, and a teacher should take these into account already at the planning stage of teaching. For example, if a learner is nervous about presentations, the teacher should create a safe atmosphere and offer alternatives for how the presentation can be carried out (Pesonen & Nieminen 2021, 51).

Different learners are motivated by different things. Some learners are interested in new things and challenges, while others are more motivated by practical benefits. Some learners need a lot of guidance and support, while others learn best independently. Next, we will take a closer look at how to promote learners' engagement in teaching.

HOW TO INCREASE INTRINSIC MOTIVATION IN TEACHING?

Motivation is an important part of learning. It affects how eager and committed the learner is to learn. Motivation is influenced by both internal and external factors. An intrinsically motivated person does an activity for its inherent satisfaction and requires no rewards to be motivated. According to Lonka (2014, 168–169), intrinsic motivation is not created only within a person, but requires a meaningful relationship or activity between the person and motivation. This could mean, for example, offering an inspiring learning environment where students can experience the joy of discovery through challenging tasks.

The opposite of intrinsic motivation is extrinsic motivation, where rewards and punishments guide a person's activities. Sometimes extrinsic motivation can transform into intrinsic motivation. As an example, Lonka (2014, 169) mentions a subject that is not of interest to a student, but if the subject is taught in a meaningful way and the examples used are relevant, the student may become interested and intrinsically motivated.

According to the self-determination theory (also known as the self-direction theory), humans are naturally active, motivated and self-directing, and they have a need of autonomy, competence and relatedness (Deci & Ryan 2000). We all possess a desire to for self-fulfilment and are able to motivate ourselves. According to the theory of self-determination, the crucial thing with motivation is its quality, not quantity. Students are motivated by autonomy, i.e. internal motives stemming from their own thinking, rather than external pressures or rewards (Salmela-Aro 2018, 11).

STRENGTHENING INTRINSIC MOTIVATION

So: how can learners be motivated and, in particular, how to feed their intrinsic motivation? When we consider teaching, it is important to increase intrinsic motivation. Intrinsic motivation in teaching can be described using the 4 Cs: Challenge, Competence, Curiosity and Context (Lepper & Henderlong 2000). Next, I will examine these areas.

Challenge refers to increasing intrinsic motivation with different, suitably challenging tasks that provide different and diverse learners with an understanding of how they managed in the task. Challenges creates curiosity towards the topic, especially when it is connected to a meaningful context or illustrated with concrete examples. According to Lonka (2014, 169–171), problem-based learning should be taken into account when designing teaching. Learners should be provided with meaningful and suitably challenging assignments to arouse their curiosity towards a topic, thus feeding their intrinsic motivation. Intrinsic motivation is also increased by linking assignments to a meaningful context.

Competence refers to the feeling of being able to manage with teaching. This could mean, for example, that a study entity is transparent: that all the assignments and submission dates



Figure 1. The 4Cs of intrinsic motivation (Lepper & Henderlong 2000).

are available to the learners from the beginning of teaching (Lonka 2014, 169–171). Assessment criteria and the matters affecting the assessment also need to be highlighted for the learners. Feedback and support from the teacher are also related to competence. A teacher must create a supportive learning environment where learners are allowed to make mistakes. This supports the learners' engagement in teaching and makes it easy for them to approach the teacher and receive support when needed (Pesonen & Nieminen 2021, 140–141).

CONCLUSION

Learning is a process that requires time, effort and motivation. Building a learning situation in accordance with the UDL principles begins with a design that takes into account different learners, considers what motivates them (intrinsically or extrinsically) and increases the learners' intrinsic motivation with the teacher's own example, inspiring teaching and encouraging feedback.

The teacher's role in interaction and engagement in learning is important. According to Lonka (2014, 169–170), interaction and inspiring teachers play an important role in feeding intrinsic motivation. If a teacher is motivated and interested about the topic they are teaching, their enthusiasm will also infect the learners. However, responsibility does not only lie with the teacher, but motivation is created in interaction with learners: "Teachers can open the door, but you must enter it yourself." (A Chinese proverb).

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4 How to take cognitive accessibility into account in teaching materials

Terhi Kärpänen

ACCESIBLE ONLINE SERVICES and materials benefit all people, but especially those with cognitive challenges or functional limitations. According to the European Commission (2020), almost 5 million people in the European Union do not use the Internet because of a disability or a functional limitation. In Finland, the Finnish Centre for Easy Language (Selkokeskus, 2022) has estimated that up to 530,000–750,000 citizens face difficulties in reading or understanding standard language. This article examines how taking cognitive accessibility into account in the preparation of teaching materials supports the UDL principles and what things should be considered when creating teaching materials. The Universal Design for Learning (UDL) framework takes all students into account already at the planning stage of teaching.

SPECIAL FEATURES OF COGNITIVE ACCESSIBILITY

Cognitive accessibility is one aspect of the framework of accessibility. Many may not be familiar with the concept of cognitive accessibility. It relates to an individual's ability to process information. Cognitive accessibility means that an online service or teaching materials are designed in such a way that they are as easy to use as possible and the information they contain is easy to understand. With regard to digital services, cognitive accessibility opens up a channel for understanding the service especially for people with cognitive difficulties and challenges.

Cognitive capacity covers the processes of acquiring, storing and using information. A lack of capacity can become apparent as problems with memory, language understanding and conceptualization (Leskelä 2019, 57). According to Leskelä (2019, 49–57), cognitive problems may be related to, for example, the perception



of space, difficulties with concentration and planning abilities as well as challenges with producing and understanding spoken and written language. People with cognitive limitations or difficulties benefit from cognitive accessibility. People with linguistic challenges who, for example, do not have Finnish as their native language also benefit from clear and understandable language and content, as well as content in different formats (image, text, video).

Cognitive accessibility is particularly useful for people with cognitive difficulties. However, anyone can face temporary cognitive limitations because of stress or a bad night's sleep, for example. It is therefore important that online services and materials are made easy to use and understand so that they can reach users as widely as possible.

GUIDELINES FOR INCREASING COGNITIVE ACCESSIBILITY IN TEACHING MATERIALS

The UDL framework supports teaching design that takes alternatives in teaching into account. Essential part of this is producing teaching materials that support different learners. Learning challenges may include attention deficit disorders, learning difficulties or environmental disturbances (Pesonen & Nieminen 2021, 40–51). Considering cognitive accessibility when creating teaching materials is one way to promote student engagement and motivation while teaching. Intrinsic motivation is fueled by clear assignments and the transparency of the study entity. This means, for example, that all assignments and submission dates are available to learners, and assignment descriptions are understandable (Lonka 2014, 169–171.) The role of the content producer is emphasized in cognitive accessibility. As teachers produce content, such as teaching materials, they have a great responsibility as regards teaching.

Although instructions are available for implementing cognitive accessibility, often people do not find or know how to use them. Papunet (2023) has compiled good content production guidelines that include instruc-

tions concerning the use of clear standard language of good quality. According to the instructions, unnecessary figures of speech, phrases or complicated sentence structures must be avoided in content production. Cognitively accessible teaching materials are clear and simple. The text is easy to understand. In particular, assignments and, for example, assessment criteria should be clearly worded. It is a good idea to support textual content with images or videos to increase the clarity of the content. Large or difficult content entities can be divided into smaller chunks. If the teaching materials contain abstract concepts, include their definitions. Key concepts and instructions should be easy to understand. It is also important to take different senses into account and prepare the teaching materials to be sensorily accessible, for example by using visual and auditory materials (Papunet 2023). Too much textual content can add to a person's cognitive load, especially if they have cognitive limitations.

In terms of cognitive accessibility, it is also important to ensure the ease of use of the teaching materials. Ease of use means that the digital service is easy to understand, the navigation is clear and that each page, function or content is easy to find (Aluehallintovirasto 2023). The same criteria apply to teaching materials. In teaching materials, it is important to maintain the same visual look and to make page structures as clear, simple and consistent as possible (Papunet 2023). It is a good idea to maintain a consistent page style or structure so that students do not think they are introduced to something new or related to a different topic. Increase accessibility by using headings and familiar icons. Another way to increase accessibility is to leave empty spaces where needed between content entities. Provide tips and instructions related to the use of the site and for memory support. Do not rely on users to remember the content on previous pages (Papunet 2023).

CONCLUSION

How can we then check the cognitive accessibility of teaching materials? By testing and requesting feedback. As regards testing, it is a good idea to ask the students for feedback on the teaching materials or, for example, to have a colleague test assignment. However, one of the most important things to take into consideration is an understanding of the user: who are the users of the teaching materials and are the different needs of learners taken into account in the materials.

Often the teacher may be blind to their own content and materials, and that is why feedback is important. Taking cognitive accessibility into account in teaching materials, it is possible to ensure that all students can have an equal and effective opportunity to learn and succeed in their educational environment, regardless of their cognitive challenges or strengths.

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5 Multiple means of action and expression in teaching

Outi Loikkanen

ONE TEACHING SESSION can have student participants with very different backgrounds and capabilities. This poses a challenge to the teacher: how to design the lessons in such a way that students with learning difficulties, attention deficit disorders or limited language skills are able to keep up, but so that also the most talented students find the lessons enjoyable and challenging? The Universal Design for Learning (UDL) framework by CAST (2018) takes different learners into account in teaching design. This article examines two principles of the UDL framework: multiple means of representation and multiple means of expression.

MULTIPLE MEANS OF REPRESENTATION IN TEACHING MATERIALS

When designing teaching materials, it is important to remember the learning objectives – what kinds of materials are best for helping your learners achieve these objectives (Ralabate 2016, 107)? Different learners have different ways and abilities of processing and absorbing information. Various disabilities, cognitive limitations and, for example, language skills affect how well one can absorb information from teaching materials. The UDL framework has three principles. One of the principles is multiple means of representation. This means that a teacher presents the content they teach in different ways, offering alternatives to enable each learner to find a suitable way to understand and learn. (Cast 2018.) Providing alternatives reduces the need for learner-specific content tailoring, as the alternatives are already available to everyone (Evmenova 2018, 148).

Examples of multiple means of representation include video subtitling, supplementing text with illustrative pictures and diagrams and the possibility of listening to the text. It is also important to be able to adjust the materials, especially self-study materials, to suit one's own needs. This may include things like adjusting

the size of texts or images, slowing down or speeding up videos or pausing in their progression through the materials as they want. (Cast 2018; Evmenova 2018, 158.)

Multiple means of representation also include using clear language and defining different symbols and concepts while connecting them to the contents to be learned. Dictionaries and lists of concepts are helpful. If teaching is in one language but the group includes non-native speakers, it is useful to state the concept also in English, for example, and ask students to find a translation in their own language. For example, could a certain concept be easier to understand in the form of a picture instead of written as a text? (Cast 2018.) Figure 1 below presents an example of how easy it is to understand the words “equality” and “equity” when using a picture compared to when explaining the concepts in writing.

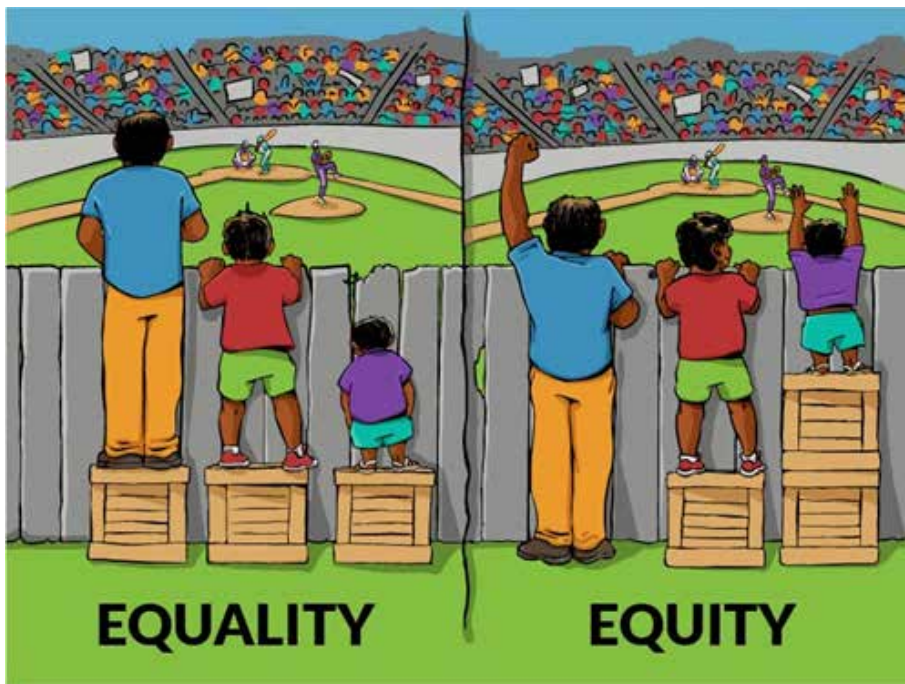


Figure 1. An example of using an image to illustrate the meaning of words (Image: Interaction Institute for Social Change, artist Angus Maguire).

The essential task of the teacher is to help learners transform information from materials into knowledge. This can be promoted by helping students to link new information to what they already know and to create connections between concepts. Helpful methods include mind maps, various illustrative examples, checklists and the possibility to apply the topic to practice. (Cast 2018; Evmenova 2018, 158.)

MULTIPLE MEANS OF EXPRESSION IN TEACHING

Another principle of the UDL framework is multiple means of action and expression. This principle encourages learners to express what they have learned in different ways and to choose the form of expression that best suits their strengths and preferences. (Cast 2018.)

The planning of multiple means of expression begins with learning objectives. What do learners need to know and how can they demonstrate their knowledge? How can they be supported in achieving the objectives? (Kearney 2022, 16; Ralabate 2016, 52.)

The first, perhaps self-evident, method is to introduce learning objectives and assignments to learners. It is important to present all schedules and deadlines and give estimates of how long it will take to complete different assignments. This information that affects the learners' own scheduling should also be easily accessible throughout the study unit, for example presented on a single page in the learning environment. (Cast 2018.)

In addition, it must be ensured that learners have access to the planned learning materials and learning environment. This can be tested, for example, by assigning them a short advance exercise that needs to be completed in the learning environment. Alternatives must be available for communication, too. Learners can be encouraged to ask questions in the discussion forum of your learning platform, so that all participants can see the answer and students can also help each other. During online lectures, use chat as a channel for asking questions, as not everyone wants or is able to speak. (Cast 2018.)

Traditionally, teaching has focused on written expression, and different reports and essays are typical forms of assignment submission. If the intention is not to practice writing and spelling, different types of submission options offer students flexibility and help them focus on learning the content. (Cast 2018.) As an alternative to a written report, an assignment can be submitted, for example, as a video or a mind map, and instead of focusing on the form or length of the submission, the teacher should assess the content and provide learners with clear assessment criteria in advance (Evmenova 2018, 154). When deciding the submission formats for an assignment, consider the possibilities of working in a group or alone. Would it be possible, for example, to complete group work alone or individual work in pairs, thus achieving the learning objectives better? (Cast 2018.)

In addition to the final assessment, learners should be given regular feedback so that they know how they have progressed. One way of implementing this is submitting a large assignment in smaller sections, which means the teacher can provide feedback after each section submission and the learner can improve their work based on the feedback. Peer feedback can be used alongside teacher feedback, in which case learners give feedback on each other's work. Reflecting on one's own work by keeping a learning diary, i.e. giving oneself feedback of a kind, helps the learner understand their progress. (Cast 2018.)

WHAT DOES INCREASING DIVERSITY MEAN TO THE TEACHER?

Help, I do not have enough time! This is often the first reaction of teachers to increasing diversity. Planning alternatives, several rounds of feedback, individual assignments instead of group work and the resulting increase in marking – it is true that all of these will take time. (Kearney 2022, 41.)

Then again, requests for alternatives from individual students in need of special support are reduced when alternatives are already available. Careful planning and clearly defined assessment criteria facilitate the

implementation and assessment of a study unit. It is also easier to give feedback when it can be constructed with the help of clearly defined assessment criteria. (Evmenova 2018, 161.)

Modern technology already enables a lot of diversity without any additional effort required from the teacher. For example, web browsers have read-aloud functions that allow one to listen to online text, or the text can be translated into another language using the browsers' translation tools. (Ralabate 2016, 39.)

Diversity increases flexibility not only for the learner but also for the teacher. On one hand, diversity may be a challenge, especially if the teacher is accustomed to always doing everything in a certain way in their own study unit (Evmenova 2018, 163). On the other hand, it may also be an opportunity that brings about more variation in teaching and assignment marking. Increasing diversity also forces one to develop their own competence, which will make teaching easier also in the future.

Increasing diversity can be challenging. Many of these challenges can be overcome through good design and resource allocation. Diversity improves learning opportunities, which should be an excellent reason for at least trying it out.

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6 Student-centric teaching through service design

Outi Loikkanen

DETERIORATION OF LEARNING outcomes, students' problems with concentration, integration of students in need of special support into regular groups – these longer-term challenges of teaching are encountered almost every week when reading the news. Service design is a method that can be applied to developing teaching. It can be used to identify learners' different needs and challenges and to come up with learner-centric solutions that help in learning and improve learning motivation. This article explains what service design is and how it was utilized in the Learning is for Everyone – LIFE! project in spring 2023.

WHAT IS SERVICE DESIGN?

Service design is a mindset, a process, and a toolset. The mindset considers the perspective of a service user, such as a student. A teacher can examine students' needs and obstacles to learning and take these into account when designing teaching. Service design as a process is a series of stages that begins with defining the challenge to be solved. After the challenge, i.e. what needs to be solved, has been identified, information is gathered and analyzed; ideas are produced; prototypes are built, tested, improved, piloted and introduced; feedback is collected and then more ideas are produced. These stages are iterative. Student feedback is collected between the stages to ensure that the teaching under development is best suited for the students' needs. Service design also provides an extensive toolset for different ways of collecting and presenting information. These tools and methods help teaching developers create a common understanding of students and their needs. (Stickdo

A description of a user persona is an example of a service design method. A user persona, or a student persona in the context of teaching, is a fictional person representing a certain student group with similar

needs, wishes and challenges related to learning. This tool helps to understand the needs and expectations of students and to design teaching to meet their needs. (Stickdorn et al. 2018, 40.) Figure 1 shows an example of a user persona profile.

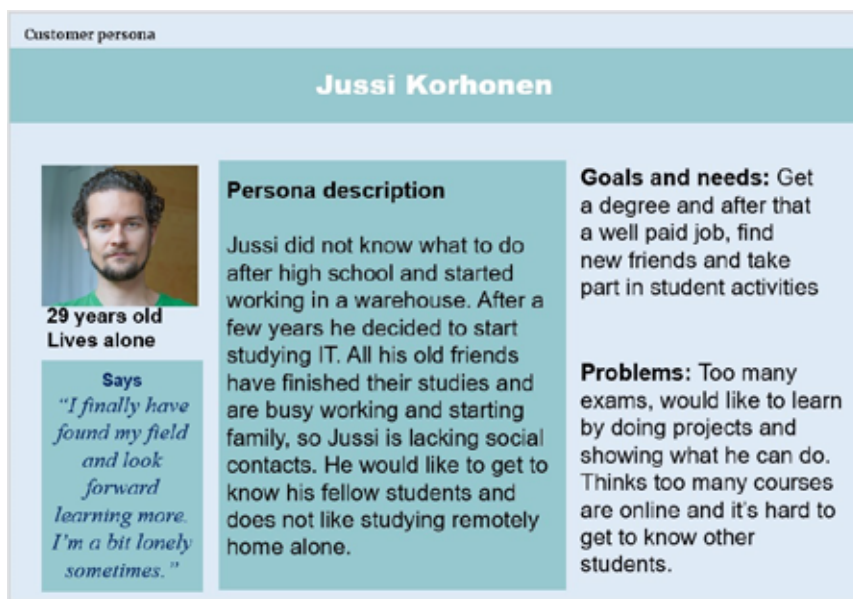


Figure 1. A student persona profile created by a student team during the spring 2023 study unit.

Increasing understanding of the target group brings several benefits to the educational institution. Service design offers a coherent and documented process that helps educational institutions develop services more efficiently and reduce unnecessary work. Service design helps educational institutions stand out from their competitors, as service design provides valuable information and understanding of students and their needs, which can be used to further improve student services and study units. This makes meaningful learning experiences possible for students, which in turn increases student satisfaction. (Adapted from Reason, Løvlie & Brand 2015, 13–14.)

This article describes how service design is used in an educational institution. However, the use of the service design is not limited to a specific sector or type of service. It can be used to develop new services and to improve existing services regardless of the sector. (Penin 2018, 50.)

SERVICE DESIGN PROJECT IN LEARNING IS FOR EVERYONE – LIFE!

The topic of Learning is for everyone – LIFE! project, i.e., taking different learners into account in the design of teaching, was integrated into the service design study unit of Laurea University of Applied Sciences in spring 2023. Including projects or business partners in the study unit is part of Laurea's Learning by Developing (LbD) pedagogy in which students learn by examining and co-creating solutions to identified challenges (Laurea 2023).

Students were assigned to find answers for the following questions:

- What motivates students to study?
- How to increase student-centeredness in teaching?

The students carried out service design work in two groups, utilizing the Double Diamond methodology by the Design Council (2019), which divides the service design process into steps that follow one another. As background material, the students were given access to the materials produced by the project, such as the *Learning is for Everyone* workbook.

The students also searched for information on the factors influencing studies and they interviewed other students. This allowed them to better understand the challenges and needs associated with studying.

The aim was to identify difficult points in the learning process and things to improve so that it was possible to come up with solutions to the actual issues identified through target group engagement. Finally, the students developed a prototype from one solution idea and tested its functionality.

IDEAS FOR PROBLEMS WITH CONCENTRATION AND LACK OF MOTIVATION

After interviewing other students, service design students identified problems with concentration and lack of motivation as key issues. As possible solutions related to problems with concentration, students identified things such as good ventilation and lighting in the classroom, smaller group sizes, removing phones for the duration of the lesson and the possibility to do something with one's hands while listening to the teacher. They also noted that interfering students should be removed from the classroom and studying in a special needs group should be made available for those that require it. In addition, there should be enough breaks in teaching.

For solving the lack of motivation, students suggested organizing remedial instruction, offering alternative teaching materials and assignments, offering different levels of difficulty for problem-solving tasks completed during lessons and providing concrete examples of the topics. The possibility for cooperation in both group work and joint projects were considered to help motivate students.

As the result of the service design project, the students created a checklist for teachers. It describes the issues that need to be taken into consideration in a more student-centered teaching. The students divided the list into four sections: the structure of the course, the course materials, during the lesson and the learning environment. These sections will be introduced next.

When designing the course structure, ensure its suitability for both distant and face-to-face instruction. In addition, the progression through the course must be logical. This includes the order of contents and assignments and the sections of the course. The course content description needs to be clear and easy to understand.

The course materials must contain concrete examples and provide clear assignments and assessment criteria. The materials need to support learning, offering the same content in various ways, such as text and video.

Online teaching should not consist of just the teacher talking; students should have opportunities for discussion in small groups and pairs. Students also need to be activated, for example using Kahoot or some other game. Online lessons should be recorded, and the students given access to these recordings.

In an online learning environment, ensure that everyone can log in and knows how to operate in the environment. Student-centeredness could also be increased by giving the students an opportunity to affect the contents of the course. One way to achieve this is by offering alternatives for some of the content. Sufficient lighting and ventilation are important in the physical classroom.

CONCLUSIONS

During the service design study unit, the students practiced using several different tools and methods and they produced a lot of material. It was interesting to note the students' observations included things also identified in the Learning is for everyone – LIFE! project that are in line with the Universal Design for Learning (UDL) framework by Cast (2018). These were related to taking different students into account and included things like offering alternatives for learning materials and assignments and paying attention to the clarity of materials and structures.

It was surprising that in their suggestions, the students did not highlight receiving timely feedback as a motivating factor or increasing student-centeredness, even though timely feedback emerged in the target group interviews. It may be that the large number of service design methods and tools used, and the amount of material obtained through them exhausted the students. Therefore, when analyzing the results, the students did not notice all issues.

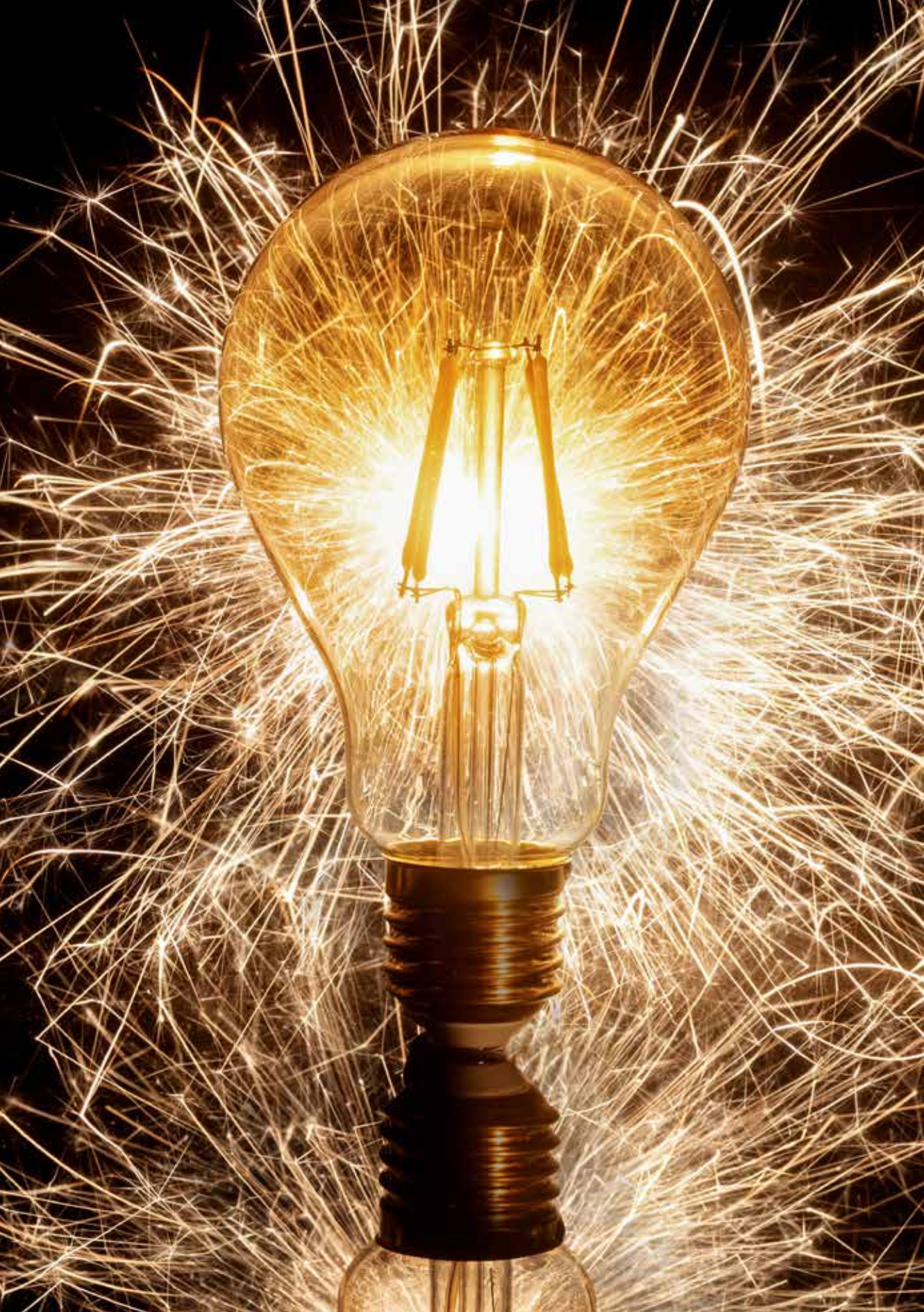
The results from the students' service design project do not fully correspond to the model of taking different learners into account based on the UDL framework by Cast (2018). However, the service design project carried out with students increases information on the opportunities the students themselves see for improving study motivation and the student-centeredness of teaching. The project also showed that service design is a suitable method to be used in the context of learning. The service design methods used were able to help in identifying the students' needs and to come up with a solution: a teacher's checklist for more student-centered teaching.

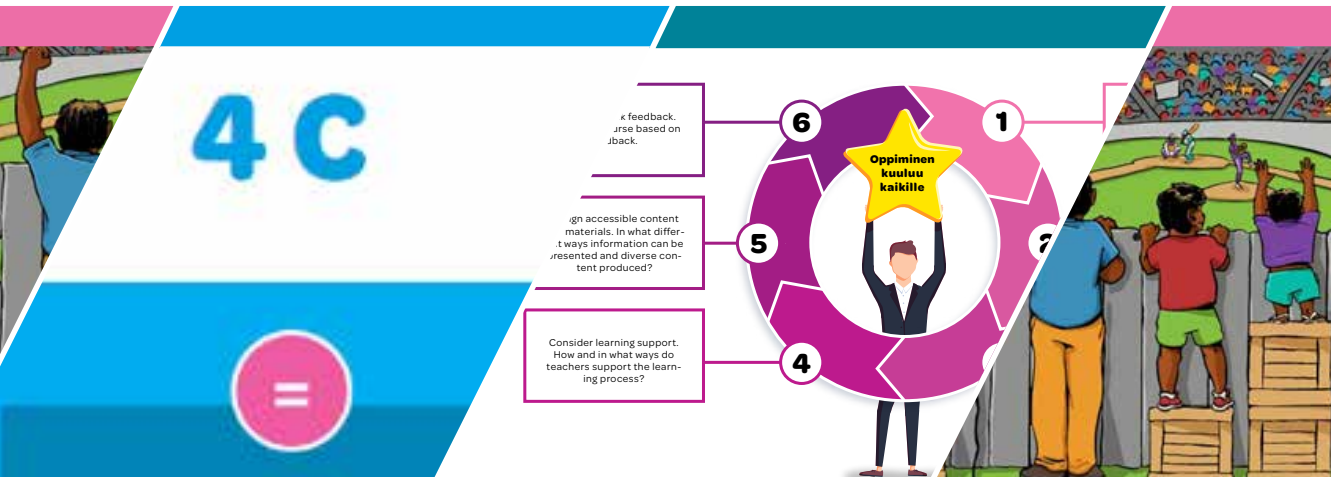
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THIS PUBLICATION WAS implemented in connection with the Finnish National Agency for Education-funded Oppiminen kuuluu kaikille (Learning is for Everyone) training module organised in 2023. The training module consisted of introducing the Universal Design for Learning (UDL) framework and applying it to the participants' own teaching. UDL concerns learning design and supports teaching that takes alternatives in teaching into account. It provides all learners with an equal opportunity to participate in teaching and also to learn. This publication, which contains practical examples, discusses the UDL framework, the wheel of design developed as part of the training, and the three principles of UDL that guide in designing areas of teaching so that they are accessible for everyone.