Exploring the Challenges of Making Digital Language Learning Materials Accessible.

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Abstract.

There is increasing awareness of the importance of the accessibility of digital materials in higher education learning and teaching. The case of teaching languages in higher education settings can present particular challenges since the volume and variety of material required to support language learning as well as the nature of the material itself may be difficult for students to access. In this digital accessibility project, we took the example of degree-level German courses at levels A1 to B2 of the Common European Framework of Reference for Languages (CEFR), and working together with our University's Inclusivity Unit and a student intern, we used the principles of Universal Design for Learning (UDL) to improve our online offering. We encountered particular barriers to making language learning materials accessible. We found that support from experienced language learners who are proficient in the target language is imperative and that some approaches that we routinely use in producing language learning materials may not be in line with the principles of UDL. We present the issues we encountered, as well as the solutions that we found, in order to support other practitioners who are planning to review their materials for accessibility.

Keywords: Accessibility; Digital language learning materials; Higher education; Inclusivity; Language teaching; Student engagement; UDL.

1.   Introduction.

A 2019 report of the Association for Higher Education Access and Disability noted that "*designing educational environments that are accessible to all students and in which all students can participate equally, is a complex one*" (AHEAD, 2019, p. 31). The complexity of facilitating this inclusivity relates to factors such as the diversity of individual needs, the curriculum in question, assessment approaches and the physical environment. Additionally, the array of disciplines on offer and their commensurate challenges contribute further to these intricacies. This paper delves into the specific issues of making digital language learning

materials accessible in higher education settings, and explores the challenges particular to creating, curating and maintaining language learning materials that are useful, engaging and accessible to learners with diverse needs, within the guidelines for Universal Design for Learning (UDL), (CAST, 2018).

In the first section of this article, we describe the context in which this digital accessibility project took place. Next, we outline the aims of the project followed by an analysis of the results where we also discuss the language-specific issues we encountered and how we resolved these. Lastly, we discuss the practical application of our findings and our future plans for work in this area. With this project, we focus specifically on digital accessibility given the importance digital aspects of teaching have gained over the last couple of years. The project follows the footsteps of the work of Inclusive UCC, "*a project group within University College Cork that is dedicated to promoting digital inclusion for all students*" (UCC, n. d.) by making resources for UCC staff available as well as supporting them in their implementation to create a more accessible digital learning environment.

2. Context.

This digital accessibility project took place in the Department of German, School of Languages Literatures and Cultures, University College Cork. The project team comprised module coordinators for the four degree-level language courses (Common European Framework of Reference for Languages[1] [CEFR] levels A1, A2, B1 and B2) and a student intern. The modules in question are 10 ECTS, 2-semester core language modules which are offered on diverse degree courses within the Arts and Commerce Faculties. Approximately 250 students take one of these four courses each year along with electives in the areas of literature, culture and linguistics. The language courses had existed in a similar form for decades. The COVID-19 crisis and the pivot to online teaching necessitated major changes and prompted much reflection on how we delivered our courses.

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[1] "*The Common European Framework provides a common basis for the elaboration of language syllabuses, curriculum guidelines, examinations, textbooks, etc. across Europe. It describes in a comprehensive manner what language learners have to learn to do in order to use a language for communication and what knowledge and skills they have to develop so as to be able to act effectively. The description also covers the cultural context in which language is set. The Framework also defines levels of proficiency which allow learners' progress to be measured at each stage of learning and on a lifelong basis.*" (Council of Europe, 2001, p. 1)

After the first closure in March 2020 due to the pandemic, which happened three weeks before the semester came to an end in UCC, the expectation was that teaching in the academic year 2020-2021 would happen on campus, observing rules and obligations with regard to social distancing. In September 2020, the pivot to online teaching happened at short notice resulting in university closures again (O'Kelly, 2020). As language teachers, we quickly adapted materials, handouts and worksheets normally provided in hard copy and moved our synchronous teaching online. These emergency measures were executed with some understanding of UDL principles and digital accessibility but without sufficient time or resources to develop them accordingly. With the experience of having taught fully online in the academic year 2020/2021, hybrid in 2021/2022 and fully in person in 2022/2023, we now have time and space to assess the efficacy of the resources we developed. As Zamborová et al. assert,

> *(N)ow that the 'emergency teaching' period is over, it is necessary to clarify further what exactly has been learnt, what there is still to learn, and how teachers can evaluate effectively and, as a consequence, choose effectively different methods of delivery in teaching for the benefit of their students.* (2021, p. 281)

Policy developments also play a key role in this project and its aims. The EU Web Accessibility Directive requires all public sector bodies to ensure online accessibility for everybody (European Commission, 2023). In the context of the higher education sector in Ireland more specifically, the National Access Plan presents ambitious aims to ensure the inclusion of all students across all programmes of study regardless of socio-economic status, ethnicity or disability. A target of this plan is to increase the percentage of students with a disability from 12.4% to 16%, placing a focus not just on access but on the participation and success of each student (Government of Ireland, 2022, p. 28).

Relevant publications regarding professional development and enhancing competences with regard to digital education and UDL have also influenced this work. We refer to the DigCompEdu Framework focusing on Area 5 which addresses educators' competences to empower learners by enhancing inclusion and active engagement (Redecker & Punie, 2017, p. 22). We have disseminated the findings of our digital accessibility project with colleagues in order to contribute to educators' digital knowledge in line with the Digital Competences Domain of the HELECs Framework (Riordan et al., 2021).

3. The Project.

In the academic year 2022/2023, our team of German language module coordinators came together to work on the accessibility of the language modules' digital language learning offering which is supported through the VLE Canvas. Working with a student intern who had recently completed her degree in World Language, including the German modules in question, we undertook an eight-week programme using the Anthology Ally software for Canvas to indicate where there were issues with the digital materials and resources that we provided to students. This project was supported by Inclusive UCC which provided financial as well as instructional design and UDL support. The software we worked with – Ally Accessibility Checker - scans "*all content in a Canvas course for accessibility issues and produces an Accessibility Score*" (UCC, 2023), pointing to issues such as a lack of suitable headings, poor colour contrast, unreadable tables and images that do not include alternative text descriptions. Unreadable tables, for example, cannot be articulated by screen readers which allow visually impaired students to access text on a digital device by converting text to speech, placing students who rely on screen readers at a disadvantage.

The project team including the student intern met on a weekly basis to discuss the priorities and to resolve issues that were encountered on a particular module. We shared the findings of the project with our colleagues across the School of Languages, Literatures and Cultures as well as the English Language Centre and School for Irish Learning. The project aimed to enhance accessibility and engagement with German language modules and to disseminate our findings with colleagues in other languages.

4. Results.

In the following sections, we outline our experiences of making digital language learning support materials more accessible. Firstly, we present the improvements in the accessibility scores achieved as a result of changes made. We then explore some of the challenges that language learning materials presented us such as the handling of bilingual texts and the exploitation of visual aids for language learning.

4.1 Accessibility scores.

During the project, our intern improved the Ally score of each of the four courses by a substantial margin. As outlined in the table below, the courses in level A1, A2 and B1 of the CEFR saw an increase of 27 or 28 percentage points in their Ally score. The B2 level course saw an increase of 16 percentage points. No course achieved a score of 100% as there is a high volume of material in each Canvas page. Additionally, some of the files are intended to be printed as opposed to read on a device by students. The discrepancy in the percentage improvement in level B2 pertains to the particularly high volume of materials on offer in this advanced course.

Table 1: Ally software score pre- and post-project.

Course	Starting Score	Finishing Score
A1	57%	85%
A2	66%	93%
B1	70%	98%
B2	72%	88%

Much of the work that was undertaken to improve the Ally score entailed the addition of appropriate headings. This is an important feature in all kinds of documents as it enables a person who uses a screen reader to choose what parts of the document the software should read aloud. Without appropriate headings, the screen reader reads the entire document each time the student wishes to access a particular piece of information. Many PDF documents also needed to be reformatted as they were neither searchable nor accessible to a screen reader. Such documents can be converted to searchable PDFs using the University's licensed software SensusAccess which allows both student and staff to convert documents into preferred formats to make them more accessible. While these considerations are pertinent to any type of digital material provided to students, in the course of this project, we encountered challenges that are specific to the provision of language learning materials.

4.2 Bilingual texts.

Incorporating the linguistic repertoire of learners is beneficial in language teaching (Königs, 2015), particularly in recent discussions of translanguaging in educational contexts (Juvonen & Källkvist, 2021; Singleton & Flynn, 2022; Vogel & García, 2017). The use of the students' L1 can be seen as a useful tool in the teaching of another language, particularly in the case of expediting complex explanations and descriptions of linguistic phenomena. While we do not assume the first language of our students, we experience English as the lingua franca in our classrooms which can be useful in supporting student learning regardless of their first language(s). Using multiple languages within one document poses problems for the accessibility of materials for all students. When a text is entered into a MS Word document, the language is automatically recognised by the software. This is beneficial for the person creating the document as the software can highlight linguistic issues offering predictive text. It is also beneficial in relation to screen readers which recognise which language to read. If a text switches between two or more languages, automatic language detection may not recognise the language correctly. This requires the document creator to highlight relevant sections, manually choosing the language used in these sections. This is a simple solution which is helpful to a person who relies on a screen reader.

Conversely, when a teacher produces audio or video material, it is good practice to provide a transcript of the material to enhance accessibility for individuals who rely more on written text. Auto-captioning of video is extremely useful in this context and has been embedded within many software products such as MS Teams and Panopto. Auto-captioning is executed in one language with the software recognising the predominant language. In code-switching this is called the matrix language (Myers-Scotton, 1993). Auto-captioning does not recognise embedded language. Instead it estimates the embedded language utterances in the predominant language leading to nonsensical output. An example of where English is the matrix language, and German the embedded language is demonstrated in Table 2. On the left is the original auto-captioned text of lines 70-72 in a video, 185 lines long on a revision of basic verbs and tense. As can be seen, Line 70, 71 and 72 (see emphasis) is the auto-captioning tool's approximation of the German participles. The transcript as amended by the student intern can be seen on the right.

Table 1: Sample of auto-generated and amended captions.

Auto-generated captions	Intern-amended captions
70 00:07:23,700 à 00:07:33,540 You take the verb stem. And you add a **G** to the beginning and a T to the end for all regular verbs.	70 00:07:23,700 à 00:07:33,540 You take the verb stem. And you add a **ge-** to the beginning and a T to the end for all regular verbs.
71 00:07:33,670 à 00:07:36,960 **Ashfield, Caleb Ward. Good luck**.	71 00:07:33,670 à 00:07:36,960 **gespielt, gelebt, gewohnt, gelacht**
72 00:07:37,800 à 00:07:45,130 Yeah, lots of of all those regular verbs have exactly the same form for their **way**.	72 00:07:37,800 à 00:07:45,130 Yeah, lots of of all those regular verbs have exactly the same form for their **Partizip II**

Unfortunately, we have not secured an elegant solution for this issue, necessitating our intern to manually correct the approximation that the auto-captions had produced. Within the software we use to auto-caption videos (Panopto), it is possible to find and replace a particular word that reoccurs throughout caption text. This is useful when the software repeatedly mistakes one spoken word in the embedded language for a matrix language word or phrase. There is no guarantee that the auto-captioning '*misinterprets*' the words and expressions the same way every time so that manual correction is always required.

4.3 Visual support for language learning.

The use of visual aids has long been a technique for language teachers hoping to support students' language acquisition, particularly in relation to vocabulary learning and grammar forms. As Funk & Koenig (1991, p. 55) assert, the first use of bold text, italics and other typographical means for emphasising words and syllables in textbooks can be found in Johan

Amos Comenius' Orbis sensualium pictus from 1658. Today's use is characterised by a wide variety of visual aids, ranging from typographical elements to the use of images, banners and multimedia artefacts such as videos to support students' learning. Teachers make significant efforts to ensure that the material they produce is designed to motivate and engage students in a multimodal learning environment, avoiding information or visual overload (Zeyer, 2017). We discovered three ways that digital visual supports for learning may impede accessibility for some learners, pertaining to the use of colour, formatting and layout, and use of images.

The use of colour as a typographical means to support student learning is a frequently used tool in language teaching. In many German language teaching materials, for example, colour is used to make a connection to the gender of a noun (blue for masculine, red for feminine, green for neuter) in order to support the students' learning (Dias de Oliveira Santos, 2014; for a critical discussion of the use of colour in textbooks, see Pagonis, 2015). Additionally, colour is often useful to highlight certain grammatical aspects, for instance the morphology of verbs in order to explain complex tense or mood systems.

Table 3 is used to present the various forms of the passive (*Vorgangspassiv*) in German. In this case, the use of colour highlights the various verb types in complex verb constructions. To build the passive in German, a form of the auxiliary verb werden is necessary as well as the past participle of the main verb. The auxiliary is marked in red (see table 3) to highlight its various forms according to the tense it requires. The main verb is marked in green and it becomes clear that this participle form remains in the same position regardless of tense or mood, and that the form does not change. Forms of the verb SEIN which is used to build the past tense with werden are marked in blue, and a form of WERDEN used to build the future tense marked in purple. An example of modal auxiliaries is marked in yellow. These colours are used consistently in further examples and explanations to support the learners' understanding and acquisition of the forms.

Table 3: Example of use of colour to support the understanding of complex grammar forms.

	Nominativ	konjugiertes Verb	Partizip II	3. Verb, wenn nötig
Präsens	Das Haus	wird	gebaut.	
Präteritum	Das Haus	wurde	gebaut.	
Perfekt	Das Haus	ist	gebaut	worden.
Plusquamperfekt	Das Haus	war	gebaut	worden.
Futur	Das Haus	wird	gebaut	werden.
Modalverb (Präsens)	Das Haus	muss	gebaut	werden.
Modalverb (Präteritum)	Das Haus	musste	gebaut	werden.

Alternative Text. Table 3: Example of use of colour to support the understanding of complex grammar forms

This table represents the various forms of passive constructions in German. The sample sentences provided and colour-coded for learners are as follows:

Das Haus wird gebaut.

Das Haus wurde gebaut.

Das Haus ist gebaut worden.

Das Haus was gebaut worden.

Das Haus wird gebaut werden.

Das Haus muss gebaut werden.

Das Haus musste gebaut warden.

We used this type of colouring to explain and elucidate complex grammatical forms and to highlight the similarities between the tenses. This becomes problematic when colour contrast

is insufficient. In our table, the yellow used for the modal verb forms may not contrast sufficiently with the background, rendering the text illegible for students, especially for those with visual impairments. A simple solution here is to be aware of recommendations around colour contrasts for written texts (see, for example, Hobber, 2021). Additionally, the recommendations for Universal Design for Learning and the Web Content Accessibility Guidelines (WCAG, n.d., Guideline 1.4.1) state that more than one pathway to learning should be provided to accommodate many learning styles and preferences so that, in this case, the use of colour should not be the only way that the information on the types of verbs is conveyed.

While following a UDL principle, a further consideration arose as to whether the text used in the table is accessible to learners who use a screen reader. Screen readers read tables cells from left to right starting at the top of the table. This can become problematic if the cells are merged in order to make the table more visually appealing to aid comprehension. The screen reader may, as a result, read cells out of order, impeding the understanding of any learner using a screen reader. Such tables may be used for vocabulary or verbs lists. A solution here is to limit the use of tables as a formatting aid, ensuring that tables used are simple and avoiding the use of merged cells.

When it comes to the use of images in language education, several types of uses can be identified such as discussion prompts, image description or motivational cues (Zeyer, 2017). While these types of applications pose their respective considerations, during our project, we have become aware of issues with the use of these images in terms of their accessibility. On the one hand, screen shots or scans will appear as images in a document which cannot be accessed by a screen reader or easily manipulated by a learner who might need to enlarge or reorganise a text to make it easier to read for their learning needs. On the other hand, we often use images to illustrate a linguistic phenomenon or to make a document more attractive. Where an image is intended to support learning, it is imperative that alternative text is provided. Decorative images that are included primarily for aesthetic purposes and which do not convey any essential information should be marked as "decorative." This indicates to screen readers that the image can be disregarded, as it does not contain any meaningful content. We also considered our frequent use of images as prompts for practice exercises or assessments. In those cases, a possible solution is to provide stimuli in other forms such as audio or written language which elicit a similar use of language.

5. Discussion and Future Directions.

This project highlights the complexity and specificity of language teaching and learning in higher education in relation to the production of support materials and their accessibility to students with diverse learning needs. In recent years there has been a huge increase in the expectations that students have with regard to digital materials and language educators have made significant advances in their knowledge and skills in this domain. This increase in digital learning supports must now be evaluated in relation to its equity to all students and their learning needs and preferences. This is particularly pertinent in language education where the offering is multimodal and the skills and knowledge that must be acquired are varied and complex. In this paper, we outlined the language-specific issues that occurred during the project and how these were resolved. We hope that in doing so, we have offered practitioners guidance on how to increase the accessibility of their resources. Our experiences of conducting this project has also resulted in us questioning the accessibility of some types of resources that we take for granted in a language teaching and learning context. We also continue to monitor technological advancements in relation to multi-language captioning in the AI age.

Ensuring that the materials we produce are accessible and engaging may seem like yet another task to be undertaken by educators. Many higher education institutions are offering support for teaching staff in the form of intern programmes similar to the one that our institution offered this academic year. Whilst a welcome support in language instruction, a generic programme is insufficient. To be effective, an intern requires proficiency in the target language, excellent target language awareness and experience of having learned that language, particularly in a higher education setting where there are specific expectations pertaining to language proficiency. The particular challenges that we encountered and which are outlined in this article would not necessarily have been identified and solved without the competences that our intern possessed.

Impactful advice that we received during this project is to aim for improvement rather than perfection. We possess an enormous amount of material that we have developed and adapted over the years, which we may not be able to make as accessible as we would like due to time and resource constraints. Conversely, embedding the principles of UDL into future materials development as a matter of course is achievable, just as we embed the principles of good academic practice into any research output.

Our future plans for enhancing our digital offering pertain to the presentation of materials and layout within our VLE. We became aware that students experienced difficulties navigating the volume of materials that were made available to them in this context producing overwhelm and demotivation. We subsequently conducted a research project to investigate student preferences pertaining to the layout of learning materials. Feedback data will be used to inform the digital architecture of our courses so that we can better facilitate students' engagement with the many resources we offer them. Working with students to continually develop our digital offering allows us to further strengthen student engagement and develop meaningful partnerships in line with the aims of the National Student Engagement Programme (NStEP, 2022)

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