The Critical Role of Subtitles and Audio Description in Enhancing eLearning Effectiveness

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Abstract

The integration of subtitles and Audio Description in eLearning materials has become increasingly significant in the realm of digital education. This article explores the multifaceted benefits and importance of subtitles in eLearning, emphasizing their role in promoting inclusivity, enhancing comprehension, and facilitating global reach. Subtitles play a crucial role in making eLearning accessible to a diverse audience, including individuals with hearing impairments and non-native speakers. The inclusion of subtitles and audio description ensures that all learners, regardless of their auditory capabilities or language proficiency, have equal access to educational content [1,2]. This aspect of inclusivity not only aligns with universal design principles in education but also adheres to legal standards in many regions, ensuring that educational resources are accessible to all [3]. Research suggests that subtitles significantly enhance comprehension and retention of information as they provide visual reinforcement of spoken words, aiding in better understanding and memory retention [4]. This is particularly beneficial in complex subjects where terminology and concepts might be challenging to grasp through audio alone. Finally, this paper also highlights how the integration of subtitles in eLearning is aligned with the trend towards mobile learning. With an increasing number of learners accessing educational content on mobile devices, subtitles and Audio Description ensure that content is comprehensible even in settings where audio playback might be inconvenient or impractical [5]. The incorporation of subtitles and Audio Description in digital education is not only a step towards inclusive education but also a strategic move to enhance the overall effectiveness and reach of eLearning content. This paper examines the key considerations involved in providing postgraduate students with an introduction to, and basic training in, subtitling and Audio Description.

Keywords: *Subtitles, Audio Description, e-Learning, Accessibility*

Introduction

The integration of subtitles and Audio Description (AD) in eLearning materials has become increasingly significant in the realm of digital education. It is important to be aware of the multifaceted benefits and importance of subtitles in eLearning. Integrating subtitles and AD can promote inclusivity, enhance comprehension, and facilitate global reach. Subtitles play a crucial role in making eLearning accessible to a diverse audience, including individuals with hearing impairments and non-native speakers. The inclusion of subtitles and AD ensures that all learners, regardless of their auditory capabilities or language proficiency, have equal access to educational content. This aspect of inclusivity not only aligns with Universal Design Principles (UDL) in education but also adheres to legal standards in many regions, ensuring that educational resources are accessible to all [3]. Research suggests that subtitles significantly enhance comprehension and retention of information as they provide visual reinforcement of spoken words, aiding in better understanding and memory retention [4]. This is particularly beneficial in complex subjects where terminology and concepts might be challenging to grasp through audio alone. The integration of subtitles in eLearning is also aligned with the trend towards mobile learning. With an increasing number of learners accessing educational content on mobile devices, subtitles and AD ensure that content is comprehensible even in settings where audio playback might be inconvenient or impractical [5]. The incorporation of subtitles and AD in digital education is not only a step towards inclusive education but also a strategic move to enhance the overall effectiveness and reach of eLearning content.

In the Spring semester of the Academic Year 23/24 postgraduate students on the MA in Technical Communication and E-Learning were given some basic instruction in creating subtitles and AD. This instruction offered several benefits, especially in the context of enhancing accessibility, developing new skills, and promoting inclusivity. Students benefitted from a deeper knowledge of enhancing accessibility and are better prepared to meet changes to legal requirements in their future professional roles, whether in content creation, education, or digital design. Exposure to the open-

source software required to create subtitles and AD also enabled students to develop their technical skills and apply best practices in timing, formatting and use. These skills are increasingly relevant in many fields, including media production, digital marketing, and education. Creating accurate and useful subtitles and AD also requires a high level of attention to detail. This skill is transferable to many other domains, encouraging meticulousness and precision. Having these skills can distinguish individuals in the job market, showing potential employers a commitment to diversity, accessibility, and quality in communication.

Subtitles

Subtitling refers to the process of displaying text on a video screen to provide a written representation of the audio component of the video. This includes dialogue between characters, important sound effects, and other auditory information which is crucial for understanding the context and narrative of the video content. Subtitling is essential for accessibility as it enables individuals who are deaf or hard of hearing to access audio-visual content. Additionally, subtitles can be used for language learning purposes and by viewers who prefer to watch videos with the sound turned off. The basics of subtitling encompass several key principles and practices that ensure subtitles are effective and accessible and enhance the viewing experience without distracting from the content. Timing and synchronisation are critical or users will get frustrated. Subtitles must accurately reflect the audio content, including dialogue and significant sound effects. Subtitles should appear and disappear precisely when the corresponding speech or sounds occur, ensuring they are in sync with the audio. Subtitles should be concise to allow enough time for viewers to read them. A general guideline is to limit subtitles to two lines of text at a time. The speed at which subtitles change should accommodate comfortable reading for the average viewer. This typically ranges from 140 to 180 words per minute, depending on the target audience. Subtitles should use a clear, easily readable font. High contrast between the text colour and the background (often white text with a black outline) helps ensure readability across various backgrounds. There is a growing body of research providing evidence that subtitles generated by the auto-subtitles system in English language educational videos can facilitate students' learning comprehension, cognitive load, and satisfaction [6].

How subtitles are formatted is also critical. Thoughtful use of line breaks can help maintain the coherence of sentences and phrases, improving comprehension. Where words are not thoughtfully hyphenated the experience of using subtitles can be frustrating [7]. Subtitles are usually placed at the bottom centre of the screen but may be moved to avoid covering crucial visual elements or to indicate who is speaking off-screen. Some music videos and advertising has played around a little with the placement of subtitles. This work is relatively new and it is good to be aware of ongoing research in this area. When translating, it's important to consider cultural differences and idiomatic expressions to ensure the subtitles are appropriate and understandable for the target audience. This may include some special considerations including sound descriptions. These are important non-speech audio cues. Examples include the phone ringing to provide context for those who cannot hear the audio or speaker identification when it's not clear who is speaking, subtitles may include the speaker's name or a description ([John] or [Woman laughing]) before the dialogue.

Technical Standards and Open Source Software

There are generally accepted limits for the number of characters per line (CPL) to ensure readability, typically around 35-42 characters per line. Subtitles should adhere to standards and guidelines set by broadcasting and streaming platforms, which may have specific requirements for formatting, timing, and presentation. Knowledge of subtitling software is essential for creating and editing subtitles efficiently. These tools often provide features like automatic timing adjustments, spell check, and preview options. Open source software options include Aegisub and Filmora (https://aegisub.org and https://filmora.wondershare.net). Aegisub is a free, cross-platform open source tool for creating and modifying subtitles. Aegisub makes it quick and easy to time subtitles to audio, and features many powerful tools for styling them, including a built-in real-time video preview. Primarily a subtitling software, Aegisub is free and open-source, designed to help in creating and editing video subtitles. It can also be used to script AD before recording them. Wondershare's Filmora is available for both Windows and Mac. YouTube also offers some tools that can indirectly assist with creating AD. The video editor allows for adding additional audio tracks to uploaded videos, and its captioning tools can be a starting point for scripting descriptions. It is possible for users to upload video and use

YouTube's tools to add non-speech information as captions, and then record and sync an AD track in the video editor.

Audio Description

Audio Description plays a critical role in making video content accessible to individuals who are blind or have low vision. The components of effective AD, including narration of key visual elements without interfering with the original audio. Audio Description provides a verbal description of visual elements in videos or live performances. These descriptions are inserted into natural pauses in the audio or during dialogues to describe vital visual details that cannot be understood from the audio alone. This includes actions, characters, scene changes, and on-screen text. Audio description is a critical accessibility feature for individuals who are blind or have low vision, as it allows them to fully comprehend and enjoy visual media content. By narrating visual elements, AD ensures that all viewers have access to the complete content narrative, enhancing inclusivity and engagement. Together, subtitling and AD play pivotal roles in making media content accessible to a broader audience. By addressing different accessibility needs, they ensure that individuals, regardless of their hearing or visual abilities, can enjoy movies, television shows, online videos, and live performances. Open-source software amplifies this impact by democratising the creation and distribution of accessibility tools, allowing for greater innovation and adaptation to diverse needs. This ecosystem of accessible content creation not only complies with legal and ethical standards for inclusivity but also enriches the viewing experience for a global audience with varying sensory abilities. When introducing AD to postgraduate students it can be helpful to begin with some examples of how AD is typically produced. Describing how the text for AD can evolve is a helpful starting point and a recent scholarly exploration, Di Giovanni (2018) examined the development of AD tailored for children, specifically including blind children, at a live opera performance [8]. The study is documented with a table that illustrates the evolution of the AD text, presenting both the initial draft and its subsequent refinement. This progression provides insights into the iterative process of enhancing accessibility features to better serve diverse audiences and is a good starting point for working with students new to the process of creating AD.

User-centric Methodologies

Research into subtitles and AD in the early 2000s initially adopted a medical model (refer to Table 1), but this approach has evolved significantly over time. Many postgraduate students now use subtitles (and sometimes AD) in their daily lives. When discussing how best to provide subtitles and AD a discussion based on their own personal encounters with subtitling and AD in various contexts—perhaps while commuting using SDH (Subtitles for the Deaf and Hard of Hearing) or listening to an audio-described film during cooking can be helpful as a starting point. These scenarios highlight the diverse circumstances under which individuals might require such accessibility services. Access needs can arise from several factors: non-native language speakers might need subtitles; individuals with visual impairments could require AD or text-based alternatives for images and written content; and those who are deaf or hard of hearing might depend on visual or textual representations of sound, which can be either linguistic or non-linguistic. Understanding the audience for these services is crucial and often neglected. The necessity for accessibility might stem not only from disabilities but also from situational conditions of the users. Therefore, it is important to conduct targeted user testing. If the service is intended for universal use, considering a broad spectrum of user profiles can be beneficial. This strategy aligns with the principles of universal design, aiming to accommodate everyone, and suggests moving beyond traditional models to more inclusive approaches [9, 10, 11].

Table 1: Who are the users? Medical model

Audio-visual Content	Users
Audio description, audio introduction, touch tours	For the blind
Audio subtitling	For the blind and persons with dyslexia
Subtitling for the Deaf and Hard-of-hearing	For the Deaf and Hard-of-hearing
Dubbing, voice-over, subtitling	For persons who do not understand the language

Research in subtitling and AD often focuses on users with hearing impairments as the primary demographic for subtitle use. However, the scope of research expanded in recent years as the framework shifted from a medical to a social model, which posits that disabilities are not individual "problems" but rather societal constructs. Currently, the approach is transitioning to a capability-based model, a complex yet vital part of the decision-making process in developing subtitles and AD services. This model, inspired by the works of economist Amartya Sen and philosopher Martha Nussbaum, centres on the potential capabilities of individuals; what they can achieve and aspire to be within their environments. This approach moves away from viewing individuals in terms of deficits, focusing instead on maximising their abilities and societal participation. The capability model advocates for creating a more inclusive society by adjusting societal structures and services to enhance individuals' abilities to lead fulfilling lives based on their personal values and preferences. This model emphasises the importance of eliminating environmental and social barriers that hinder individuals' potential for achieving well-being. This model integrates considerations of personal abilities, social circumstances, economic status, and environmental factors to support the well-being and autonomy of individuals.

What are the Key Challenges?

Creating AD presents several challenges, reflecting both the technical aspects and the nuanced skill of effectively conveying visual information to audio [12]. Finding natural pauses in the original audio to insert descriptions without overlapping important dialogue or sound effects can be difficult, especially in fast-paced content. Balancing the need for brief descriptions that fit within these pauses and the desire to provide detailed and vivid imagery for the audience is a constant challenge. Deciding which visual elements are most important and should be described can be subjective. Different describers might choose to focus on different aspects of a scene. Crafting descriptions that are vivid, concise, and clear requires skilful language use. The describer must anticipate what visual information is most crucial for understanding the scene, emotion, or action. There are also technical challenges. Ensuring that descriptions are properly synchronised with the video content so that they are informative and not disruptive or confusing. The voice quality is also very important. The tone, pace, and clarity of the narrator’s voice are crucial. The voice should be pleasant, easy to listen to, and should not detract from the content of the AD. The preference for synthesised voices versus human voices among blind or visually impaired individuals can vary widely depending on several factors, including the context in which the voice is used, the quality of the voice synthesis, personal preferences, and the purpose of the content. Ultimately, the choice between synthesized and human voices often comes down to personal preference and the specific use case. Many blind or visually impaired individuals use a combination of both depending on the situation—for example, a synthesized voice for quick information browsing and a human voice for enjoying a novel or detailed article. With advancements in technology, synthesized voices are becoming increasingly natural-sounding, potentially bridging the gap between the two options. Cultural Sensitivity must also be considered; descriptions should be culturally sensitive and not rely on visual stereotypes or assumptions that may not be universally understood or that could inadvertently offend viewers.

Guidelines and Standards

Combining subtitles and AD in e-learning content involves thoughtful integration of both elements to create a fully accessible learning experience. The goal is to ensure that all learners, regardless of their hearing or visual abilities, can access the content effectively.
See https://www.w3.org/WAI/media/av/captions/ for detailed information and regular updates on guidelines. Producing high-quality AD can be resource-intensive, requiring skilled writers, voice actors, and editors, which may be prohibitive for smaller productions or content creators. There is a need for greater awareness about the importance of AD and more training for creators on how to effectively produce them.

Conclusion

The creation and use of subtitles and audio AD involve complex processes and multiple considerations that are often overlooked or taken for granted by those not directly involved in their production. Before taking this module, although the students were aware of subtitles and AD, they had not considered the complexities involved. As UDL becomes more embedded across all sectors of

education and continuous professional development it is imperative that material is designed to be as accessible as possible. As educators, we can significantly enrich the educational experience and better prepare students for a diverse and inclusive world. These activities not only benefit students directly by expanding their skillsets and sensitizing them to inclusivity but also indirectly contribute to a more accessible and equitable society.

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