APPLICATIONS FOR CREATING TEACHING MATERIAL FOR FLIPPED CLASSROOM EDUCATION

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Absztrakt

ALKALMAZÁSOK TANANYAGOK KÉSZÍTÉSÉRE FORDÍTOTT OSZTÁLYTERMI OKTATÁSHOZ

A „flipped classroom" (fordított osztályterem) módszer alkalmazása nem újdonság a pedagógiai gyakorlatban. Használata leginkább a koronavírus-járvány idején nőtt meg, amikor a tanulók és hallgatók otthon, tanárok fizikai jelenléte nélkül kényszerültek online tanulásra. Ebben a módszerben nélkülözhetetlen segítséget jelentenek az oktatásra alkalmas tananyagokat tartalmazó videofelvételek. Ezeket legtöbbször maguk a tanárok készítik. A cikk videofelvételek készítésére alkalmas szoftverkörnyezetekkel foglalkozik. Jellemzőik kölcsönös összehasonlítása segíthet az alkotóknak kiválasztani az igényeiknek leginkább megfelelőt.

Kulcsszavak: flipped classroom, oktatás, tananyag, szoftveralkalmazások
Diszciplínák: pedagógia, informatika

Abstract

Using the flipped classroom method is not new in pedagogical practice. Its usage increased mostly during the coronavirus pandemic, when pupils and students were forced to learn online at home without the physical presence of teachers. Video recordings with teaching materials suitable for education are an indispensable aid in this method. These materials are mostly created by the teachers themselves. The paper deals with software environments suitable for creating video recordings. Comparison of their characteristics will help creators choose the one that best suits teachers' needs.

Keywords: flipped classroom, education, teaching material, software applications

Discipline: pedagogy, informatics

Introduction

The flipped classroom method can be defined as a teaching method in which students engage with learning materials provided to them in the form of videos, presentations, or other forms before the actual class. Subsequently, class time is devoted to collaborative discussions, tackling challenging aspects of the curriculum, and applying knowledge through teacher-led practical exercises.

One of the goals of flipped classroom teaching is to overcome some of the fundamental deficiencies of traditional forms of education that date back to the mid-fourteenth century.

The flipped classroom emphasizes the use of blended learning approaches that incorporate a variety of cognitive and affective responses on the part of learners (Clark, 2015).

Having students watch assigned short instructional videos on their own before a face-to-face or online lesson can play a positive role in refocusing students' attention on learning (Abuhmaid and Abood, 2020).

Flipped classroom

Teaching with the flipped classroom method is not new in pedagogical practice. Its use gained greatest momentum during the coronavirus pandemic, when pupils and

students were forced to attend classes online from home without the physical presence of teachers. Educators have sought various solutions to make the effectiveness of online teaching equal or at least wanted to closely resemble that of face-to-face teaching, and many have turned to the flipped classroom method.

In traditional teaching, students receive information in school and practice the material at home. Even the name flipped classroom implies that in flipped learning, activities are rotated. Students are first introduced to the material at home with the learning materials provided by the teacher (texts from books, videos), and then they clarify, practice, and extend their knowledge at school under the supervision of the teacher (solving examples, problems, etc.).

For remote learning, educators provide instructional videos, which are mostly created by them. The advantage of video teaching material is that it can be easily corrected, extended, improved, and directly provided to the students. If they teach multiple classes, there is no need to create the same material repeatedly, leaving more time in each lesson for solving practical problems and answering any questions the students may have.

Advantages of using video recordings for students include the ability to learn anytime, anywhere, pause the video (if they need to review the material or take a break), re-watch parts they don't understand, and learn at their own pace.

Teaching using the flipped classroom method has its supporters and detractors. The most common argument from opponents is that students will not gain the same level of knowledge like in the face-to-face classes. It is obvious that the method is not suitable for teaching all subjects. However, there have been multiple studies that have compared student achievement in subjects taught using the flipped classroom method with that of face-to-face method, and most of them have yielded positive conclusions (Pšenáková, Pšenák and Szőköl, 2024).

Software applications

For the creation of e-learning materials, appropriate software or software applications are needed. Flipped classroom model is no exception, since it relies heavily on electronic learning materials, particularly videos.

Video editors are an essential tool when creating video recordings containing material that students need to learn before class. In our research, we focused on these following three.

Microsoft Clipchamp

Microsoft Clipchamp is a free application from Microsoft that allows you to record and edit videos.

The application's user interface consists of the following parts (Figure 1):

1. list of objects that can be added to the project (video clips, music, photos, captions, emoticons, logos, and other graphic elements),

2. drop-down menu (after selecting a specific area from the left bar),

3. video project preview window,

Figure 1: Parts of the application user interface, in the case of Microsoft Clipchamp
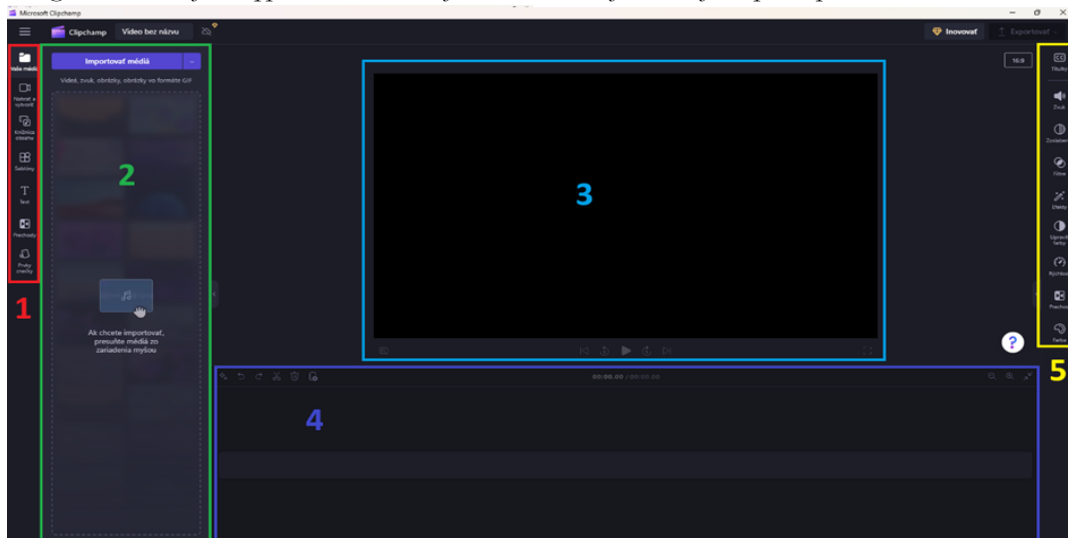
4. timeline,

5. toolbar used for graphic and audio correction of the resulting video project (volume, audio track disconnection from the video track, filters and artistic effects, brightness, contrast, temperature, saturation, recording speed).

MS Clipchamp Options: With Microsoft Clipchamp, you can directly record from both the webcam (by selecting the Camera option) and the screen (by selecting the Screen option), or record from both the webcam and the screen at the same time (Screen and Camera option). In this case,

Figure 2: An example of how to view links to created recordings in the media list, in the case of Microsoft Clipchamp
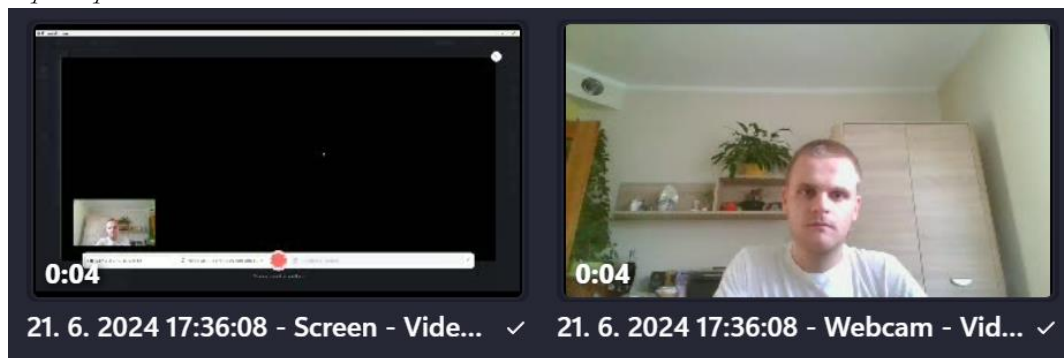
two video files are created and saved when the recording is complete, and links to them are automatically added to both the media list (Fig. 2 and Fig. 1, Part 2, respectively) and the timeline (Fig. 1, Part 4). Note: Recordings are saved to the Down-loads directory by default.

The video file with the camera footage can be embedded directly into the screen recording, and can even have its size and position adjusted, which is a feature limited to the paid versions of many applications.

It can also record audio only or convert text to speech using artificial intelligence. The length of speech generated in this way can be a maximum of 10 minutes.

The application also offers the option to enable speech-to-text conversion in the form of subtitles. This is a feature that is especially useful when creating video lectures for the deaf as well. However, it is necessary to speak and articulate clearly. In the case of words (especially technical terms and proper names), the application does not always transcribe them correctly (e.g. English terms are transcribed phonetically), which can be additionally corrected by clicking on the generated text.

In case of trimming unwanted parts of the footage, the timeline runner needs to be set to where the user wants to split the video. Clicking on the scissor icon will split the video. The part of the video to be cut from the project is deleted by clicking on the trash can icon or by pressing the delete key (Figure 3). A peculiarity of the application is that after removing elements from the strip, a free space remains. This can be deleted in the same way.

Figure 3: The process of cutting out unwanted parts of the video, in the case of Microsoft Clipchamp.
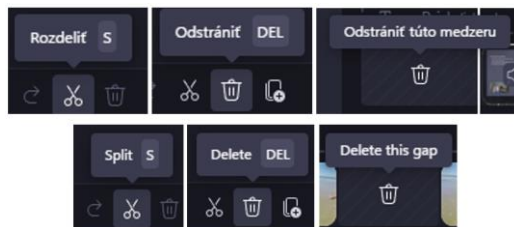

The project is saved to the final video file by clicking Export. The application offers the option to save to Microsoft OneDrive online storage or to a local drive in mp4 format and without watermarking. Such an option is usually paid for in other applications.

The Content Library tab in the object list (Fig. 1, part 1) offers a rich database of back-ground music, shapes, sound effects, so-called stickers, various backgrounds, images, frames and short GIF animations.

The user can define his own style or choose from predefined templates. The selected template needs to be added to the timeline, to which links are added in the form of several tracks: captions, animations, icons, emoticons, video, and audio track (Figure 4). These tracks can be freely edited, multiple templates can be added and combined, multiple tracks can be added in parallel (inserting different elements into an image, image within an image), spaces can be created, and so on. Everything is done on a timeline that is intuitive to use.

Figure 4: Sample timeline with embedded links, in the case of Microsoft Clipchamp
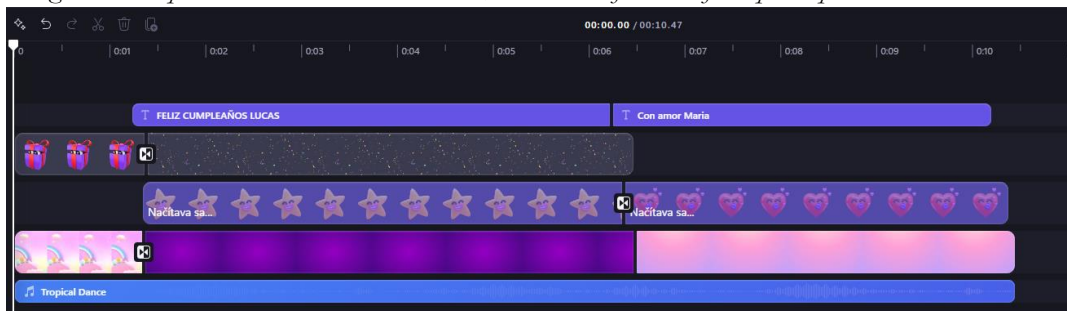
Summary: The Microsoft Clipchamp application is a free tool that allows you to record and edit videos, with many useful features and an intuitive user interface.

The application includes webcam, screen or both recording, text-to-speech conversion and vice versa – subtitles generated from the spoken word. Video editing includes features such as cropping, adding effects and subtitles, while timeline manipulation is intuitive and allows for detailed editing.

The exported file can be saved to OneDrive or a local drive in mp4 format and without watermarking. The content library offers a wealth of background music, effects and template options that can be freely combined and customized on the timeline.

All these features make Clipchamp a suitable choice even for less technically savvy users who can use DEit to create attractive, modern, and original audiovisual content.

Open Broadcaster Software

Open Broadcaster Software (OBS Studio) is a free and freely distributable multi-platform application for mediating live broadcast and video recording (Bailey, 2024). It presents a convenient programming environment with a user-friendly graphical interface.

Among the most important characteristics of OBS Studio we could include:

1. free to use – freeware,

2. open source,

3. customizable recording settings including video resolution, frame rate and audio settings,

4. multiplatform – suitable for Windows, macOS and Linux operating systems,

5. ability to create multiple scenes simultaneously,

6. availability of plugins and extensions,

7. low hardware requirements.

Basics of working With Obs Studio: The graphical interface is intuitive and displays the most important elements of video recording. The following elements are in the main application window (Figure 5):

1. Scenes: create multiple scenes simultaneously with seamless switching between them during recording. Scenes are different arrangements of sources on the screen of the recorded video. Adding scenes is possible in the Scenes panel at the bottom left of the OBS

Figure 5: Preview of the main window in the case of OBS
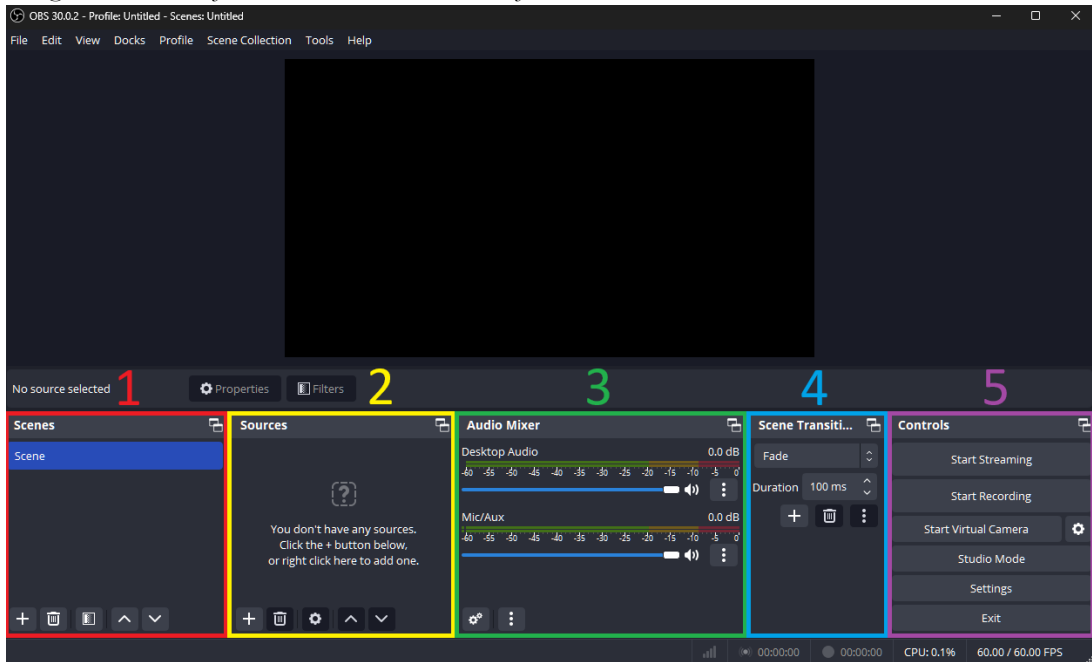
Studio window by selecting Add or the (+) button. A title must be entered (e.g. webcam overlay, desktop capture) and clicking the OK button will create the scene. Switching between scenes allows different content to be displayed seamlessly. Scenes are switched by clicking on a specific scene in the Scenes panel or by selecting a keyboard shortcut.
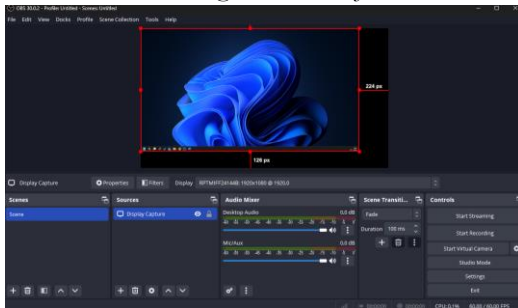
2. Sources: elements that make up the video content (video/audio inputs, images, text overlays...) added to each scene. Sources are the individual elements that make up the content of a scene. There can be multiple resources in a scene, which can then be moved around in the scene view. OBS Studio supports different types of resources. The

most used sources for creating video content are:

- Captures sound from a microphone or other sources.
- Captures sound from speakers or other sources.
- Captures the entire monitor or a specific application window.
- Adds images to the scene, such as overlays, logos, or backgrounds.
- Adds text overlays for titles, captions, or other information.
- Adds a webcam or other video input.
- Captures a specific window or application.

Adding sources can be done in the Sources panel at the bottom left of the OBS Studio window, right-clicking by selecting Add or pressing (+) will add a new source to the scene. For example, the source can be a Monitor Capture, Video Capture Device, Image, or Text. The settings for the selected source can be configured, for example a drop-down menu can be selected to add a webcam. Click OK to add the source to the scene. Multiple sources can exist in one scene. OBS Studio allows you to manipulate the dimensions and the arrangement of the graphic sources on the recording Figure 6). You can select a source in the preview and change its dimensions and position.

Figure 6: Manipulating with dimensions and size of sources on the recording, in the case of the OBS.

sources serve as audio input/output for individual scenes. There is also a way to record audios for all scenes globally. In the Settings → Sound menu, in the Global Sound Settings section, select the sound sources that will be shared between all scenes (Figure 7).

Figure 7: Audio Settings, in the case of the OBS
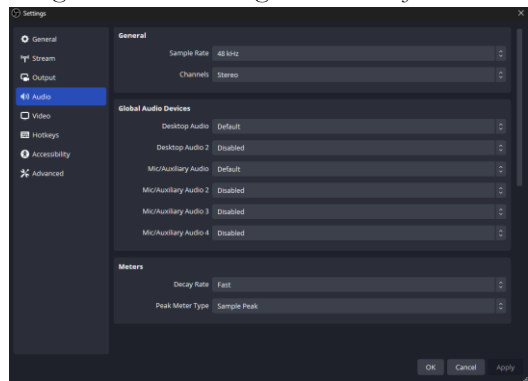
If you can't see your audio devices, they may be turned off. Check your system to make sure all audio devices are turned on. You can then check your sound sources in the settings → Sound menu. By default, the sound mixer will show all functional devices as global sound sources.

3. Audio Mixer: controls the audio levels of the different sources. The audio mixer allows you to control the sound levels of different sources, and individually adjust the volume of different sound sources to achieve the desired sound balance in the video. Sound sources can be added to the Sources panel. These sound

4. Scene Transitions: the effects used for transitions between scenes. You can switch between scenes seamlessly during trans-mission Figure 8). Transitions between scenes allow you to define the effects to be displayed during the transition. The transition time can also be set within the transition.

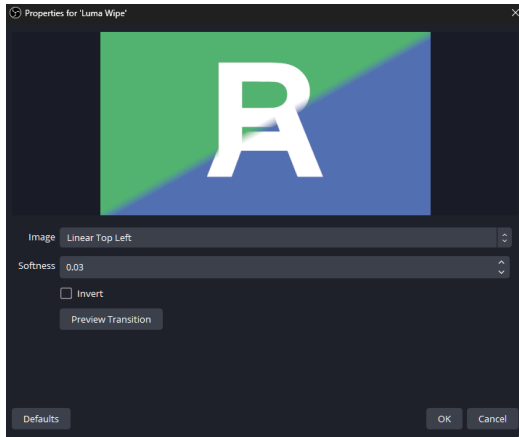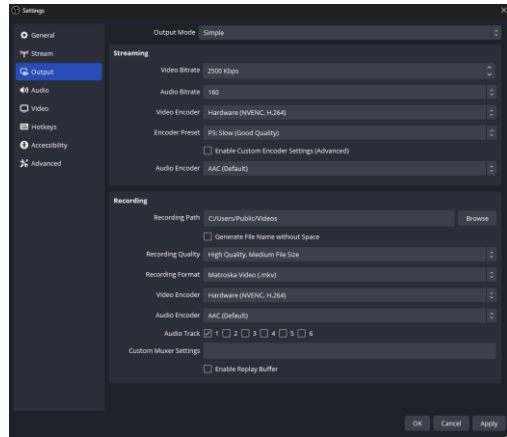*Figure 8: Showcase of transitions between scenes, in the case of the OBS*

Figure 9: Output settings, in the case of the OBS

5. Controls: buttons to start/stop recording or broadcasting, setting buttons. To record video press the Start Recording button, to stop recording press the End Recording button, which appears only when recording is in progress. Before the actual recording, it is advisable (necessary) to check the path settings of the folder where the video will be saved. You can change this in the output settings in the settings → Output menu in the Recording section (Figure 9). Within this setting, the output recording format can also be changed. Commonly used formats are Matroska Video (.mkv) and MPEG-4 (.mp4).

Summary: OBS Studio is one of the most reliable and feature-rich video recording tools available. The application is freely available for download and use is royalty-free. Its graphical interface is clear and intuitive to navigate, making the app suitable for beginners and advanced users alike. Despite its simplicity, it meets the requirements set for applications suitable for video creation. Frequent updates and community-driven development also contribute to its stability and reliability, making it a suitable choice for long-term video recording, but it's not possible to edit videos.

CLIDEO

Another software that we investigated for its potential to be used in the creation of flipped classroom learning materials is Clideo. This online video editor contains several features that can be used to create recordings. Of course, it includes basic features such as uploading video, editing, adding sounds or music and subtitles. The created video recordings can be edited, corrected, resized and so on in various ways. If we use the site without subscription, the exported videos will have a watermark.

If an educator creates a video recording using Clideo, they can remove or add new parts from the recording after the recording is complete. Captions can be added to the recording. This feature is well suited, for example, for teaching a group with students with different mother tongues. Although adding subtitles is not a complicated process, it is time consuming. The option to add music to the recording is also one way to make recorded lectures more interesting.

Basic clideo features: The basic functions of the application are triggered by the icons located on the left side of the screen (Figure 10).

1. Media: This function allows us to upload videos, images, or voice recordings. By clicking on the uploaded media, you can also resize videos and images (Figure 11).
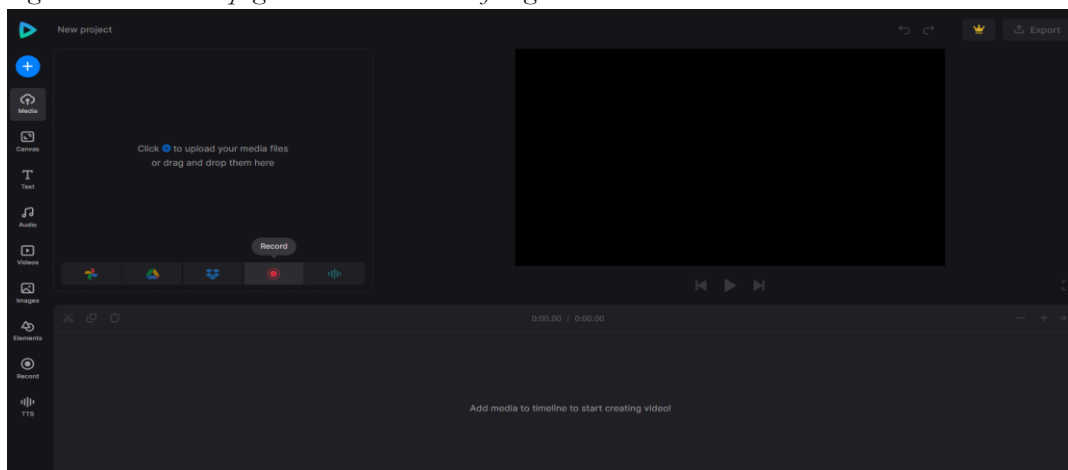
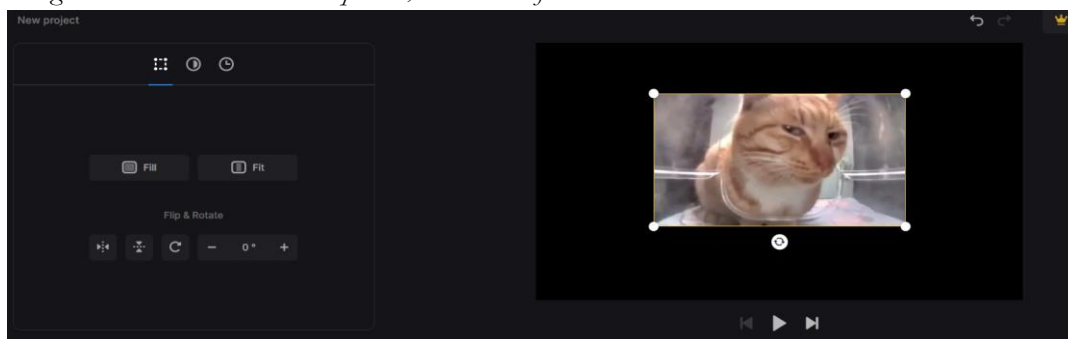*Figure 10: Clideo web page with toolbar on the left edge*
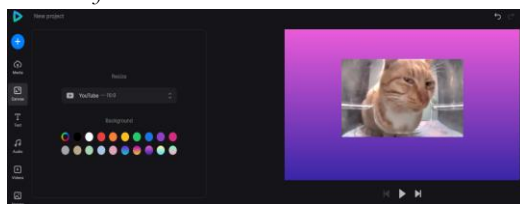

*Figure 11: Shrink and save the picture, in the case of the Clideo*

2. Canvas function: In this context, canvas refers to the background of the video. Software offers various canvas sizes that the educator can choose from, as well as an option to adjust the canvas colour (Figure 12).

Figure 12: Setting and canvas size and colour, in the case of the Clideo

3. Text: With this function, educators can add text to the video. Text can be edited in various ways, e.g. change font, text color, size, etc. It is also possible to set how long the text will be displayed on the video in the timeline (Figure 13).

Figure 13: Adding text to a video, in the case of the Clideo
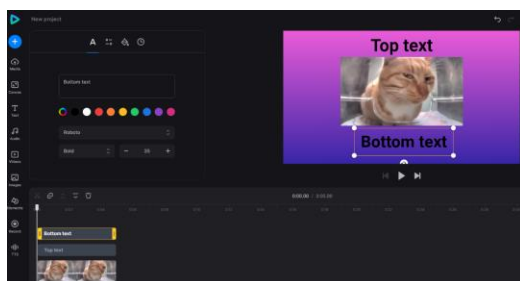
4. Audio: with this function educators can add music to the video from the playlist Clideo offers. Click on the picture of the song to listen to it. Of course, the song can be shortened, and its volume can be adjusted (Figure 14). If the creator would like to add his own music, he must do so via the "Media" function.

Figure 14: Adding music to a video, in the case of the Clideo
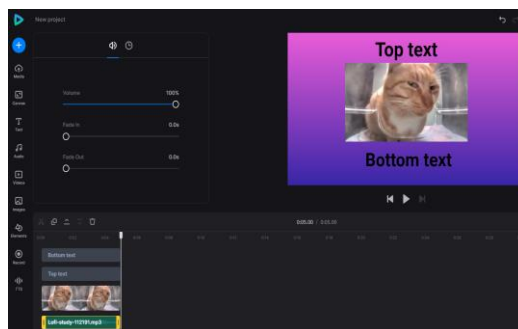
5. Images: With this function, the creator can add various images to the video. Clideo itself already offers several AI-generated images (Figure 15). It is also possible to search for images that have not been generated by the computer, but if the user would like to add their own image, they must do so again via the "Media" function.

When the video recording is complete, it can be exported. Unfortunately, when working in the free version, a watermark appears in the video. To get a recording without the watermark and in better quality, it is necessary to pay a subscription fee. At the time of writing this article, the subscription cost was €9 per month.

Figure 15: Adding a picture to a video recording, in the case of the Clideo
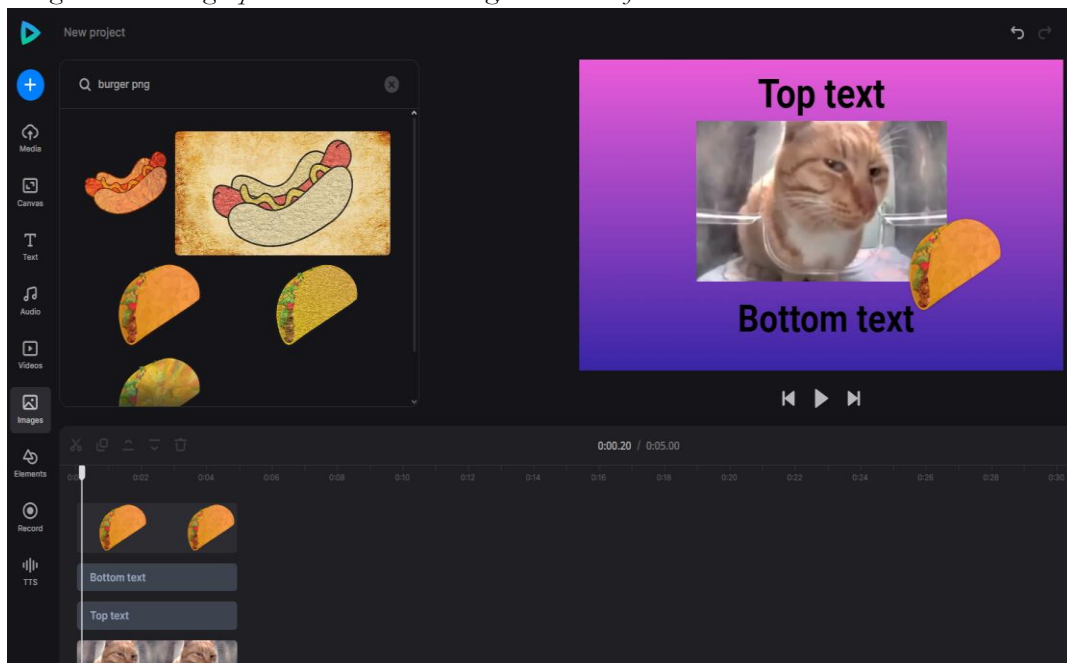
Summary: Clideo is an interesting web application that is easy to use and therefore suitable for the novice user. The downside of the free version is the watermark, which could distract students when watching the video. Another downside is that the site is only good for small projects and short videos. The advantage is that the recordings can be prepared on older computers and different operating systems.

Comparison of the above software

In Table 1, we have compared the video recording applications described above based on some of their characteristics.

Based on the data presented in Table 1, these applications basically provide almost all the necessary features for creating and editing video content for flipped classroom learning. They offer a graphical environment that is clear and relatively easy to use. The choice of which application to use is therefore up to the creator, who can choose which best suits his or her needs and computer skills.

Conclusion

In this article, we have listed and briefly characterized just a few of the vast array of software that are suitable for creating video content for teaching using the flipped classroom method.

Table 1: Comparison of applications

Features		Applications		
		Clipchamp	OBS	Clideo
Freeware		yes	yes	yes
Video editing		yes	no	yes
Screen recording		yes	yes	yes
Webcam recording		yes	yes	yes
Text to speech		yes	no	yes
Speech to text		yes	no	no
Watermark in free version		no	no	yes
Picture in picture		yes	yes	yes
Editing by artificial intelligence		yes	no	no
Supported resolution:	HD	yes	yes	yes
	Full HD	yes	yes	premium only
	QHD	no	yes	premium only
	4K	premium only	yes	premium only
	8K	no	yes	no
Supported platforms:	Windows	yes	yes	yes
	Linux	no	yes	yes
	Mac OS	no	yes	yes
	iOS	yes	no	yes
	Android	no	no	yes

We have selected those that are available for free and thus can be obtained by virtually anyone interested. Another selection criterion was ease of use, so that even users who are less technologically proficient can use them. The applications have different but similar user environments, so everyone can choose the one that suits them best.

We think that educators should be open to new ways of teaching and be prepared to adapt their teaching to the needs and skills of their students.

The flipped classroom can be a very useful teaching method if used and implemented correctly. Overall, a flipped classroom should give students more flexibility in their learning and allow them to reach their goals more quickly. However, consideration must be given to whether this method suits the students and teachers in each situation and what impact it will have on student learning and performance.

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