

6. CHALLENGES OF COVID-19 PANDEMICS, ON-LINE TEACHING WITHIN VOCATIONAL HIGHER EDUCATION FOR HEARING-IMPAIRED STUDENTS

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Abstract: *Given the occurrence of the Covid-19 pandemics, the art teaching process within the higher education system had to incorporate the on-line experience, with the help of dedicated software platforms. This paper proposes a solution for making remote teaching more effective for hearing-impaired students, so that they may have access to the oral explanations of the teaching staff, given the circumstances of the lack of linguistic IT support for the Romanian language in the dedicated software for PCs.*

Key words: *higher education, art, students, hearing impairment, solutions*

1. Introduction

Ideally, vocational higher education, especially in the field of visual arts, should be equally accessible to all concerned, including people with disabilities. In reality, however, the situation is far from being ideal, and this for many reasons, which we will set out below. In this case, we will address the situation from the perspective of a student with hearing impairment, who is currently studying at the Faculty of Visual Arts and Design, whose high school training was done in a special high school, where teaching was done by means of sign language. Hence the first issue, as in higher artistic education teachers do not have the skills to use this type of language, and experience in communicating with people with hearing loss is relatively limited.

Normally, in courses that are held in physical format, it is recommended that a person with a hearing impairment be positioned as close as possible to the teacher, so that he can also benefit from reading on his lips. Unfortunately, in the current context of the Covid-19 pandemic, in these courses, all participants must wear masks and a relatively large distance between participants must also be maintained.

2. Discussions

One solution offered in this presentation is to use a customized variant of support technology that can be used for online courses also by people with hearing impairments. From this point of view, we need to remember that support technologies are considered as "compensatory tools" for people with disabilities, providing greater independence in everyday life²⁹⁸. Applicable to our case, of hearing impairment, we can briefly mention some of these forms of support technologies:

- Communication support:

- *telecommunication:* mobile phone (text and video), computer / webcam,

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²⁹⁸ Luștea, Anca (2014), *Tehnologii de suport pentru elevii deficienți de auz integrați*, ResearchGate.net, https://www.researchgate.net/publication/309242759_tehnologii_de_suport_pentru_elevii_deficienti_de_auz_integrati

communication via internet;

- *one-to-one communication*: pencil and paper, mobile phone (text and video), computer / webcam;

- *educational activities*: handwriting recognition software, iCommunicator, etc.

In the absence of the use of sign language, another form of support technology with which the professor can more effectively convey the educational content to the hearing impaired, can also be the tool used to convert the voice into written text (Speech to text).

This tool is widely implemented on mobile phones or tablets with Android / IOS operating systems, while on PCs with Windows operating system, it is unfortunately impractical. Among the few exceptions, we mention only the Microsoft Office 365 suite (online), as well as the Microsoft Teams application, both of which offer subtitles for audio content.

Unfortunately, these Windows applications completely lack support for spoken Romanian language, as such, the function of converting voice to text is at least currently unavailable.

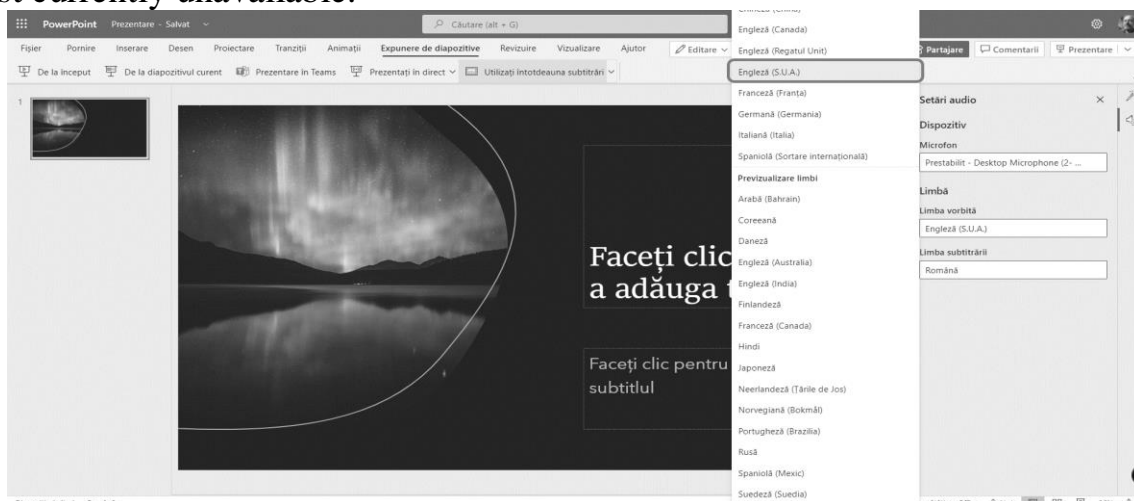


Fig. 1. Subtitles in Microsoft PowerPoint 365 cannot be used in case Romanian language is being spoken

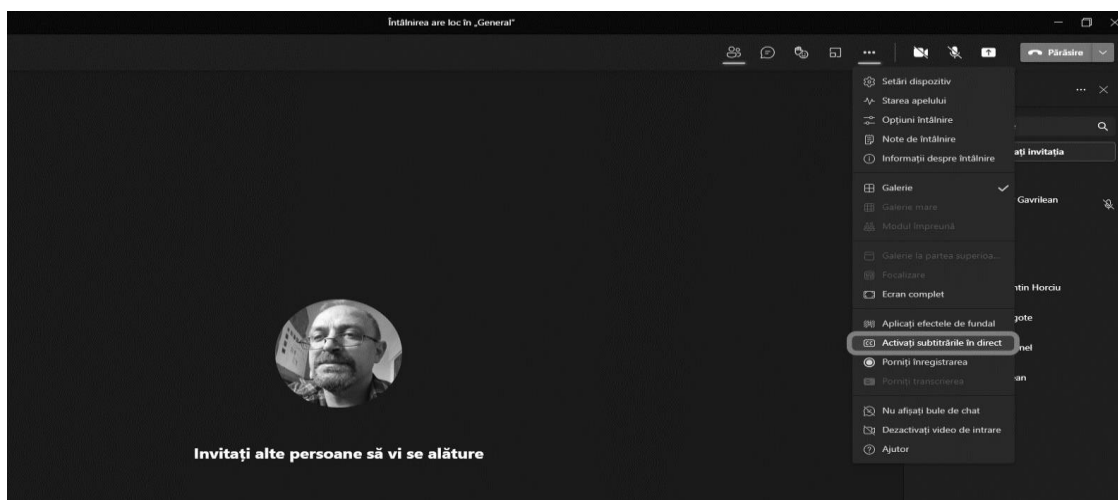


Fig. 2. Live subtitling in Microsoft Teams, initially accessible only for English, were expanded for other 27 languages; unfortunately, Romanian is not among them

One compromise, which combines the advantages of the main devices we use

(PC and smartphone), is the use of the mobile phone as the main device for converting audio content to text, the image of which is later mirrored under Windows using a freeware application, allowing it to be combined with other signal sources; undoubtedly, a webcam could be useful for people with hearing loss also for lip-reading. This system can be implemented with the help of some basic hardware components - PC and Smartphone, as well as with some affordable accessories:

- Video capture card;
- Connection and conversion cables (HDMI-HDMI, USB A-USB A etc);
- HDMI-USB C adapter;
- In addition, we will use some free software applications, such as OBS, Microsoft Teams, etc.



Fig. 3. Video capture card; Figure 4. Cable USB A – USB A (it comes usually with teh capture card); Figure 5. Adaptor USB-C – HDMI; Figure 6. Cable HDMI – HDMI

The principle of operation is as follows: the phone runs the speech to text application, the video signal being sent to the capture card and then inserted with its help into the PC. Here the image is captured using the OBS application, whose virtual camera then allows it to be displayed in M. Teams or any similar application.

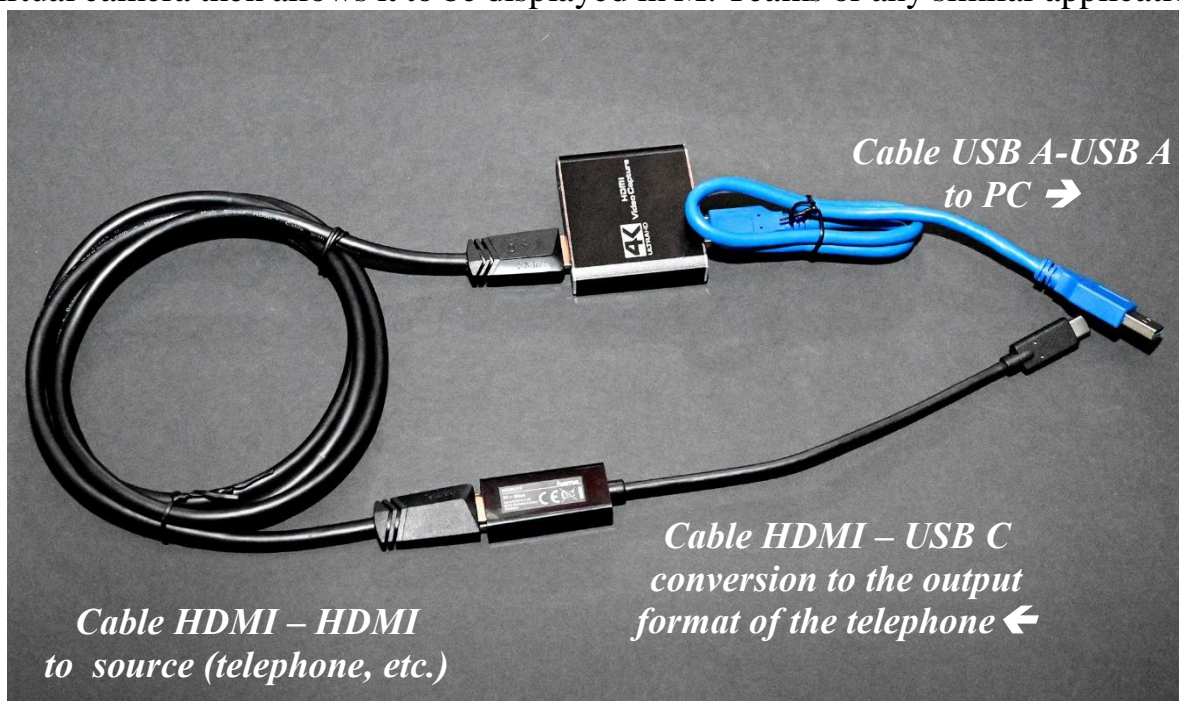


Fig. 7. The connection route of the specified equipment



Fig. 8. Full system configuration is illustrated here in portable variant

Utilized software applications are as listed below:

- *OBS - Open Broadcaster Software* is a free open-source application for PC, for video recording and live streaming running under Windows, Mac or Linux. It should be noted that the virtual camera needs to be started from OBS, after setting the desired configurations, so to allow its recognition by the streaming applications such as M. Teams;
- *Transcriere Live* is a free application that runs on Android phones, which makes conversations and surrounding sounds more accessible to hearing impaired persons.

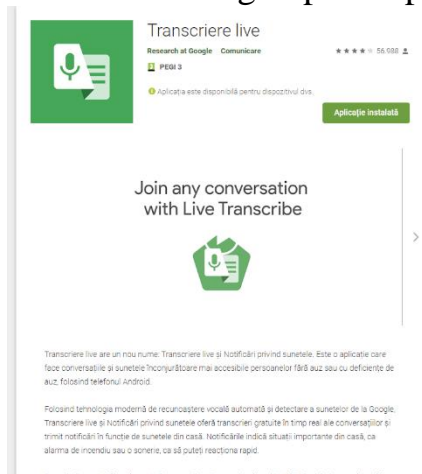
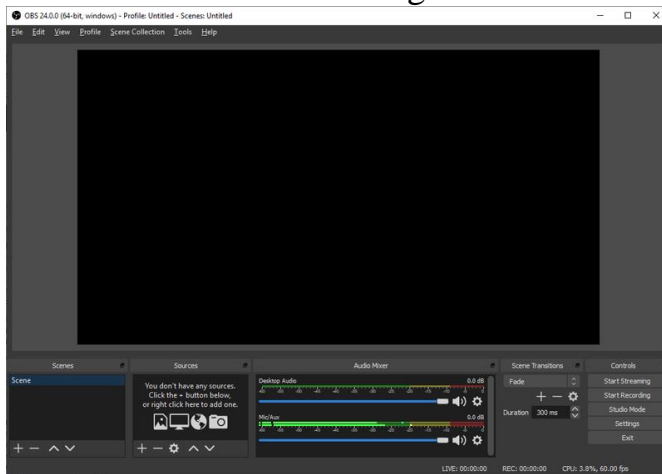


Fig. 9. Free OBS application; Figure 10. *Transcriere Live* Android application

- Alternatively, both for Android and IOS or IosPad operating systems, instead of *Transcriere live* one can use the dictating into a Word document achieved via *Google Keycard*, both applications allowing the installation from App Store / Magazin Play. Mention is to be made of the fact that the generic keyboard in IOS allows an excellent speech to text conversion.

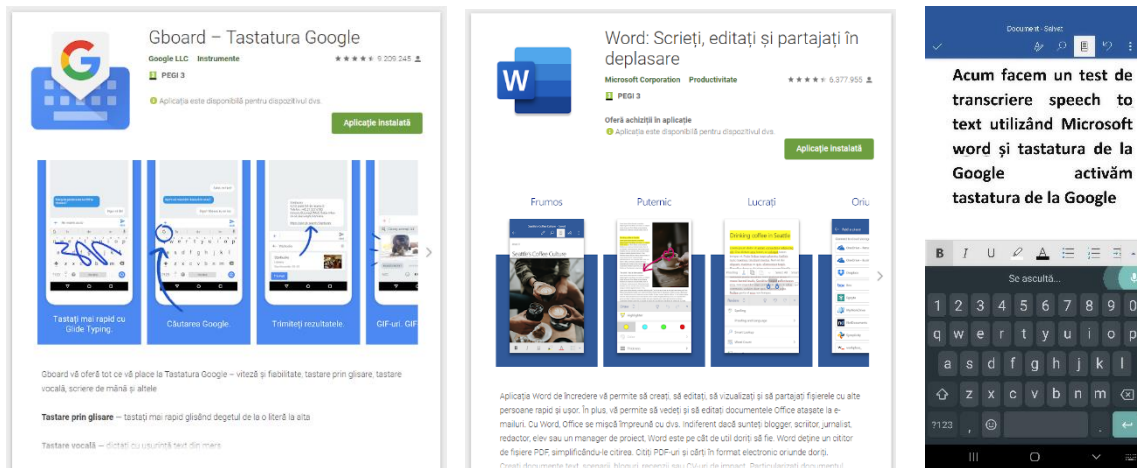


Fig. 11. Google Keycard Applications; Figures 12, 13. Microsoft Word (Android, IOS) application that allows text capturing by beams of voice command from GBoard

3. Results

In a first usage scenario, we will reproduce a common situation, consisting in the use of a webcam, combined with the image of the phone mirrored on the PC²⁹⁹, through which we display the result of speech to text conversion, made with the *Transcriere live* application. In the second scenario, we will add to the existing sources (phone, webcam), a third image source, namely the PC desktop, in which a Powerpoint presentation runs in the background.

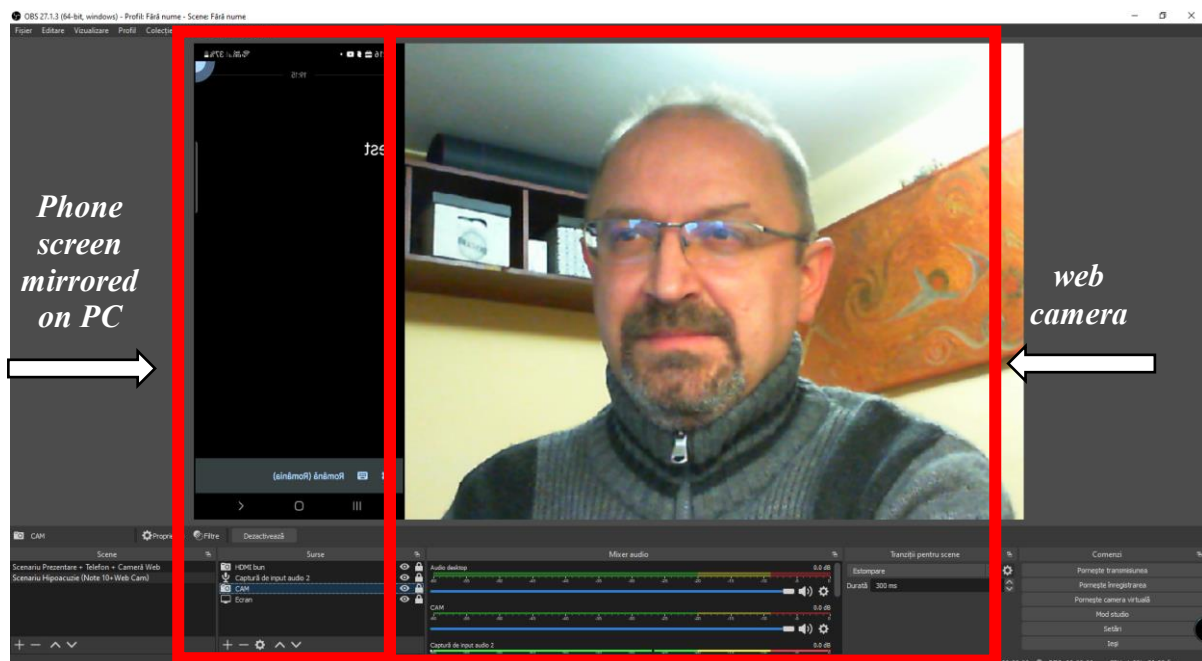


Fig. 14. Easiest option: mirroring the web camera and the *speech to text* application

²⁹⁹ To view this image correctly online, it must be mirrored in the OBS application.

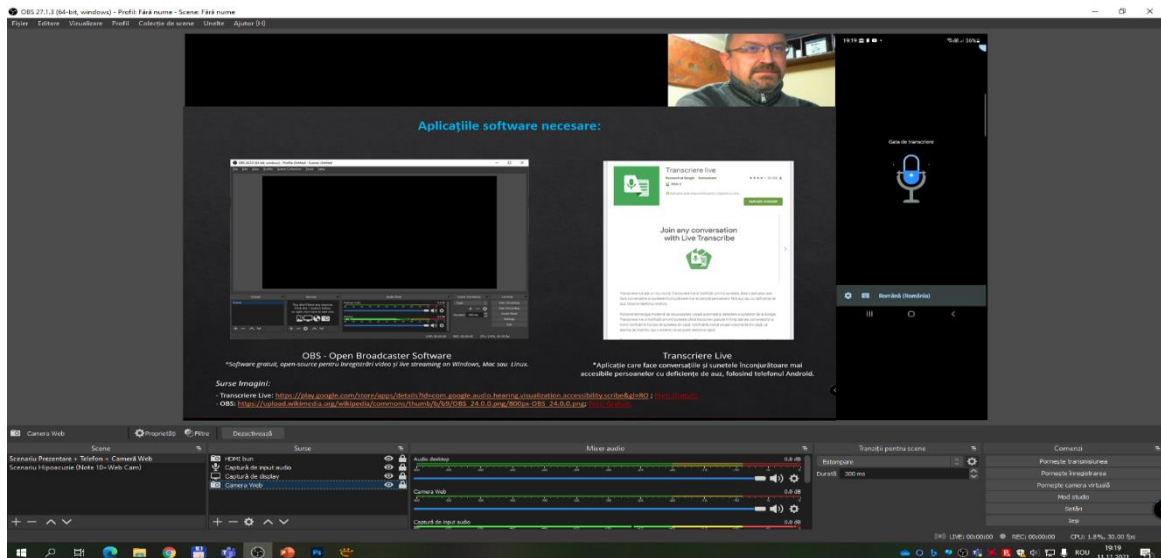


Fig. 15. In this configuration, one can also see the desktop presentation from the Teams application

Following the feedback resulting from the interaction with the students, we consider necessary to make some recommendations to those interested in giving online classes to people with hearing impairments:

- Front and most visible positioning of the face in front of the webcam, in order to offer the possibility for students with hearing loss to "read" from the lips;
- Repeating in front of the camera the questions asked verbally by the other students;
- It is necessary to pay special attention to diction, in order to allow a speech-to-text conversion with the highest degree of accuracy;
- Verbal presentations need to be done at a slower pace, on the one hand for the successful conversion of the verbal presentation into text, and on the other hand, to give students the time needed to read the on-screen subtitling;
- Constantly following the notifications, respectively the texts communicated on the presentation chat, basically one of the main methods by which students with disabilities can signal a problem, an observation, or even request an intervention;
- Providing students with text (chat, captions) or video recordings, which allow to recover any shortcomings during the presentation.

4. Conclusions

Among advantages and disadvantages of using such system, mention should be made of:

Advantages:

- The possibility of displaying as a text in Romanian the verbal presentations made online by the teachers, the comments on the course support, as well as the real-time answers to the students' questions;
- Automatic scrolling of the text transcript, as the presenter intervenes;
- Relatively low implementation costs for the one-way option (teacher => student): between 250 - 400 Ron;
- Ability to apply this communication system to all types of online meetings and lessons, not just Microsoft Teams or PowerPoint;

- Possibility to use other devices, such as tablets, etc., which also allow the creation of sketches, drawings;
- Saving the transcripts in the form of text, as well as the video recording of the sessions, aspects that allow its further consultation;

Disadvantages:

- It involves a series of minimal technical skills (connecting hardware equipment, initializing video image sources);
- The accuracy of the transcript is variable, requiring a quiet environment and a sensitive microphone;
- Lack of immediate feedback on complex online presentations (Powerpoint, Webcam, Live Transcription, etc.);
- Taking the teacher out of the personal comfort zone.

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Sources of images

1. Figures 1, 2, 11 - 15: Gavrilean Bogdan (Printscreen - processed images)
2. Figure 3: emagst.akamaized.net/products/34968/34967180/images/....jpg
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8. Figure 10: play.google.com/store/...audio.hearing.visualization...