

2 Using video materials in English for technical sciences: a case study

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Abstract

In the digital era, university instructors working in English for Technical Sciences (ETS) have opportunities, some might say obligations, to use audio-visual resources to motivate students. Such materials also call on cognitive and constructivist mechanisms thought to improve uptake of the target language (Tarnopolsky, 2012). This chapter reports on a small-scale study on the effectiveness of audio-visual materials in the development of comprehension and vocabulary skills in ETS. The study was conducted at the College of Applied Technical Sciences in Serbia and involved three groups of students: an audio-visual group exposed only to the video resources, a control group using web print-outs, and a combined group with access to both types of materials. Student performance was compared, and evaluation questionnaires developed to collect feedback from all participants. This chapter details the entire process of the study, elaborates on the findings, and gives an analysis of the data obtained to advocate for a more extensive use of audio-visual material in ETS practice.

Keywords: audio-visuals, comprehension skills, vocabulary skills, t-test, English for specific purposes, ESP.

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1. Introduction

The world we live in today is constantly changing due to technological discoveries that are shaping our daily routine and becoming an inextricable part of our daily lives. These changes are so rapid that sometimes it is not possible to notice them in time and react appropriately. English for Specific Purposes (ESP) practitioners who teach Technical English (TE) courses, however, seem to be on a ceaseless quest for innovations in domains of science and technology in order to satisfy the needs of their students. They need to use the available material on high-tech achievements in their ESP classroom, and also need to modernise their ESP courses, thus providing students with substantial professional language input and updated information.

YouTube, which offers a wide variety of video clips that deal with professional topics, is one of the most useful and effective teaching aids in the modern TE environment. It contains all the latest professional information to be found in documentaries, popular science shows, tutorials, lectures, advertisements, and much more. If properly selected, these materials can operate as audio-visual resources that bring real life into the classroom, present students with every-day professional situations, and play the role of valuable authentic material, which altogether is of great importance in the constructivist system of ESP teaching. That is why audio-visual instruction material in the form of YouTube clips is considered a tool that can modernise the teaching/learning process and meet the interests and needs of students who crave to be in touch with technology. The study to be presented in this chapter discloses how students of technical sciences react to video resources in ESP classes and reveals the achievements of students instructed by such teaching aids.

2. Recent research on the audio-visual resources in EFL/ESP courses

Studies that have been conducted recently on the use of Audio-Visual Resources (AVRs) in English language teaching and learning mainly explore

the attitudes of general English language teachers and students towards audio-visual resources as teaching tools. For example, such studies investigate how AVRs affect primary school children (Parvin & Salam, 2015) and secondary school children in learning English (Ode, 2014), or how they influence the performances of university students (Kausar, 2013; Mathew & Aldimat, 2013) in their English language and literature classes. They also give insight into how secondary school English literature teachers perceive the role of AVRs in motivating students to read literature and develop their critical and creative skills (Yunus, Salehi, & John, 2013), or, for instance, show the extent to which English Language (EL) teachers are satisfied with the quality of the audio-visual material provided by libraries (Ashaver & Igyuve, 2013). All of these studies were mainly conducted by means of evaluation questionnaires that provide both qualitative and quantitative data highly supportive of the use of audio-visual resources in the EFL classroom.

In addition, there are studies that deal with the impact of AVRs on particular language skills. Such studies (1) focus on the usefulness of AVRs in building students' competence in pronunciation (Gilakjani, 2011; Ranasinghe & Leisher, 2009), (2) elaborate on the effects of AVRs in promoting target language communication, that is, the speaking skills of students (Çakir, 2006; Natoli, 2011; Ramin, Reza, & Nazli, 2014), or (3) study the importance of video instruction in teaching vocabulary (Gross, 1993; Wright & Haleem, 1991). They, furthermore, take listening skills into consideration to investigate how visual material can be used as a teaching strategy for improving listening comprehension skills (Potosi, Loaiza, & Garcia, 2009), showing that video sessions contribute to a better mastery of listening skills and a greater motivation for students to participate in conversation. Studies devoted to language skills also test how audio-visual, audio, and video tools affect the writing skills of EL students (Ghaedsharafi & Bagheri, 2012), finding out that most advanced skills in writing are displayed by the students in the audio-visual group, whereas the weakest skills are seen among students in the video group. The advantages of audio-visual resources over other teaching tools, as well as their classifications and their specific features, are explored by other authors as well (Asokhia, 2009; Daniel, 2013; McNaught, 2007; Viswanath & Maheswara, 2016).

Recent research on audio-visual resources in ESP environments is less common. A significant study was conducted by [Al Khayyat \(2016\)](#), who determined that ESP skills were better developed in students who had been instructed by a combination of audio-visual resources and computerised material than in students whose instruction was based on conventional materials. This conclusion was made by comparing the students' speaking and writing abilities. As far as the specific terminology among ESP students is concerned, a study was carried out with the intention of determining how audio-visual resources could be used to develop students' vocabulary skills, confirming that AVRs can positively impact not only vocabulary but also writing skills in ESP students ([Lin, 2004](#)).

In addition, perceptions of ESP teachers regarding the use of AVRs in teaching were also explored. One such study was conducted by [Şahin and Şule Seçer \(2016\)](#) among the English teachers in an aviation high school to see how efficiently they had been using video materials as warm-up activities in their classes. Focus group interviews used by the authors revealed that AVRs were not as frequently incorporated in classes as expected. The biggest obstacles for implementation of AVRs seemed to be the shortage of time to use video material, the inadequacy of the equipment used, or insufficient computer literacy of teachers who needed to cope with technical problems that occurred in class.

[Mutar \(2009\)](#) is one of the rare authors who studied the impact of AVRs on a technical English course. He compared the overall scores of students who were using audio-visual materials with a control group with no access to such materials. His study revealed a significant difference between the two samples, with the experimental group scoring significantly higher. However, this finding should not be taken for granted due to the fact that Mutar's evaluation instrument had certain limitations concerning the scope of exercises for testing comprehension and vocabulary skills.

The study to be presented in this chapter, however, was not conducted to explore the cumulative effect of AVRs on the teaching/learning process in one ESP course, but rather to check the effects after a single use of video resources in class. Since there is a possibility that ESP practitioners might be unable to use

video material during each and every class throughout the course, due to the obstacles previously mentioned by Şahin and Şule Seçer (2016), the sporadic usage of video resources is something which is more realistic and therefore should be tested as such. In addition, this study focussed only on comprehension and vocabulary skills to explore more deeply the impact that AVRs could have on these particular linguistic competencies. The main purpose was to see if the ETS material at the tertiary level of education was easier to grasp and memorise through the application of video resources; thus the effect of AVRs on cognitive capacities was also of interest in this study.

3. Benefits of implementing audio-visual resources in ESP classes

Speaking of the effectiveness of video materials in teaching, Ode (2014) stated that “audiovisual resources do not only increase the motivation of teachers and learners, [but] they [also] add clarity to the topic taught and make learning more interesting” (p. 195). Ode is just one of the authors who claims that video materials bring added value, making classes more appealing and making teaching material easier to understand. Mannan (2005) and Dike (1989) also spoke in favour of AVRs as tools for clarifications on complex subject-matter. Mannan (2005) stated that AVRs “help the teacher to clarify, establish, correlate and coordinate accurate concepts, interpretations and appreciations, and enable him to make learning more concrete, effective, interesting, inspirational, meaningful and vivid” (p. 108). Unlike professional texts which can be full of ambiguity, abstract words, and meanings, audio-visual materials can present concrete examples and eliminate abstraction from language. This is achieved through a variety of linguistic and non-linguistic cues that are displayed in a video. This way, abstract ideas which are accompanied by concrete visual presentations can become more understandable to the audience. When watching the material and listening to it simultaneously, students can almost immediately test their understanding of a certain video content, their audio and visual capacities being stimulated at the same time. They can rely on many paralinguistic features too, like mimicking, gestures, postures, or attitudes

that can assist them in grasping the meaning of the study material, which can facilitate learning of their ESP content.

Apart from these advantages, studies have shown that video instruction also has beneficial effects on retention of the material which is being taught (Barry, 2001; Clark & Lyons, 2004; Njoku, 1980; Paivio & Clark, 1991). For instance, Njoku (1980) pointed out that AVRs promote learning and make it more durable due to the fact that they have an impact on more than one sense at a time. Since audio-visual materials engage our visual and auditory capacities simultaneously, they lead to the creation of strong conceptual images in our minds. These conceptual images are associations of pictures with words, which once installed in our minds are more likely to stay there on a permanent basis and be recalled more easily.

Apart from all this, AVRs can expose students to authentic language which is accurate, vivid, conversational, and related to real-life experience. This kind of language input can have a positive effect on intensifying the use of the target language in ESP classes, as Wilson (2001) implies by saying that “the use of visuals enhances language learning on one hand and increases the use of target language on the other” (p. 11). In her opinion, when input language is reused in creative ways, it can help students to improve their communication, which will become more proficient over time. This opinion is shared by Tarnopolsky (2012) who advocates the use of audio-visual material as authentic input in ESP. In his constructivist blended learning approach, which combines traditional methods with modern web-based technologies, Tarnopolsky stresses the importance of practical experience in e-learning. As a supporter of the input-output theory, which requires that students are given a chance to practice what they have learnt, he proposes an entire set of ESP activities (role-plays, case studies, simulations, etc.) with recommendations for integration of the four skills. In this process, he claims that post-viewing activities are as important as the viewing activity itself: “only the online resources which blended learning activates in the learning process may provide sufficient authentic materials for modeling professional activities and professional target language communication in the classroom” (Tarnopolsky, 2012, p. 15).

This small-scale study relies on Tarnopolsky's blended learning approach, which states that "successful knowledge and skills *constructing* is achieved owing to students' regular Internet research on professional sites in English" (Tarnopolsky, 2012, p. 15, emphasis in original). Therefore, in this small-scale study, internet resources are implemented as instructional materials, and post-viewing activities are employed with the intention of testing whether students with video input learn better than the students who are not exposed to video materials. This study was part of an initial needs analysis to determine curricular priorities among applied technical science students at the Serbian university of Nis for the coming academic year. Since many students who enroll at the College of Applied Technical Sciences have never had ESP classes during their high school education but have rather attended classes of general English, it was significant to see how they, as first year students, react to ESP and whether they preferred traditional teaching based on written materials to the use of video resources. Perhaps, more importantly, the study also sought to determine any differences in achievement across instructional conditions.

4. A small-scale study: effects of AVRs on comprehension skills and the use of vocabulary in TE settings

As already noted, the goal of this study was to determine to which extent AVRs have positive effects on student comprehension and vocabulary skills in the field of ESP after just a single exposure to video materials. The experiment was carried out at the beginning of the ESP course with 70 students in three intact classes of first year students (aged 19-20) of Modern Computer Technologies, Communication Technologies, and Industrial Engineering departments, who respectively formed the video, text/image, and feedback groups.

The first two groups were taught an ESP unit lasting for one 45-minute session on a topic in mobile technology and Active-Matrix Organic Light-Emitting Diode (AMOLED) displays. In each session, the students first completed a five-minute pre-test, were given a ten-minute mini-lesson on AMOLED displays,

then completed a 25-minute test, before a five-minute feedback questionnaire. The mini-lesson format differed across groups: the video group (27 students) was exposed to audio-visual material, while the text/image group (26 students) was given only written materials. A third group (17 students) was asked to rate both types of pedagogical resources only in a feedback session after a 20-minute mini-lesson. The null hypothesis was: There is no significant difference between the test results of the students who were exposed to the video and those who were not. The results are reported in three parts: pre-test, main test and feedback (questionnaire).

4.1. Prior knowledge

Before the main testing, all 53 students from the video and text/image groups took a pre-test, the purpose of which was to check the students' prior knowledge of AMOLED displays used in smart mobile devices. The pre-test encompassed two simple questions: (1) Have you ever heard of AMOLED displays? and (2) What do you know about AMOLED technology?, to which the students provided written answers. The pre-test allowed us to rule out inter-group differences in background knowledge as well as a potential ceiling effect (where prior knowledge is so well developed as to render further instruction superfluous). Only 25 students (13 video, 12 text/image) had heard about AMOLED and were able to provide only the basic information. Therefore, the pre-test disclosed that the topic could be classified as a new instruction material in vocational English, and that there were no significant differences in prior knowledge across groups, as can be concluded based on the results obtained, shown in [Table 1](#).

Table 1. Pre-test results

Average score (total = 3)	Video group N =27	Text group N =26
0-1.0	21	22
1.5-3	6	4
Mean	0.78	0.67
SD	1.01	0.93

4.2. Pedagogical materials and instruments

The second phase consisted of the instruction part and the assessment part. During the instruction section, the video group was exposed to the video material about AMOLED displays (“Why AMOLED enables the best displays for smartphones”²). This video is a short Samsung advertisement recorded in the form of a cartoon. The advertisement presents AMOLED displays in a very good manner, drawing attention to all the important technical details of this new piece of technology. It features a young female character with whom the students could easily identify with as mobile phone users. The video is especially useful because it contains a segment in which all the major performances of AMOLED displays are summed up, which makes the material easier to memorise.

The text/image group was given two texts to read about AMOLED displays, from 2 different Internet sources³. By reading both texts, the students could approach the topic from two different angles and memorise the reading material better. The teaching materials provided both groups with similar learning opportunities: both the video and the texts were based on authentic, authoritative content. Whereas the video contained additional information on AMOLED features, the text contained more details on the structure of AMOLED displays. However, the test that was administered to both groups did not address these differences and focussed only on the points shared by both the text and the video.

4.3. Comprehension and vocabulary tests

Following the ten-minute session with one type of resource or the other, each group was immediately tested on their comprehension and vocabulary skills via a written test. The test consisted of two exercises: the first one had four comprehension questions about the topic, each graded from 0 to 3 on the basis of meaning (vocabulary) rather than grammatical accuracy or spelling. The vocabulary exercise comprised of a list of 13 words/phrases to be translated

2. <https://www.youtube.com/watch?v=EMYksNkH868>

3. See supplement: <https://research-publishing.box.com/s/03dgtaxps5terq8ckevo0ipmvggkfa9o1>

from Serbian into English, including transparent and technical terms, which were graded on accuracy and spelling.

5. Results

The results of the main test are shown in [Table 2](#).

Table 2. Main test results

Average score (total=18.5)	Video group N=27	Text group N=26
0-9.4	18	25
9.4-18.5	8	2
Mean	5.73	5.29
SD	1.88	1.14

A t-test performed on these group means is significant at $p < 0.1$ (not the more commonly accepted $p < 0.05$ level), suggesting a marginal advantage for the video group. This finding is supported by measures of average length of responses: the video group wrote longer, more elaborate answers to the questions in the comprehension exercise, as shown in [Table 3](#).

Table 3. Comprehension exercise results

Item	Video group (average number of words per answer)	Text/image group (average number of words per answer)
1.	2.74	1.5
2.	1.37	2.23
3.	1.56	1.08
4.	2.89	2.12

In order to rank student scores, the assessment scale shown in [Table 4](#) was established. While eight students from the video group obtained a grade of about 9.4, set as the passing grade, only two students from the text/image group did so. These two students were the outliers whose performance brought up the overall group average.

After the test, both groups completed a customised questionnaire where they gave their opinion on ten statements (using a Likert scale) and wrote a comment in the box designed for an additional open-ended question. The questionnaire analysis determined the most frequently selected answer for each question in each group separately, as it can be seen in [Table 5](#).

Table 4. Assessment scale

Grade	No. of points	Video group (N=27)	Text group (N=26)
5	< 9.4	19	24
6	9.4 -11.22	3	0
7	11.23-13.05	2	0
8	13.06-14.88	1	0
9	14.89-16.71	1	2
10	16.72-18.5	1	0

Table 5. Most frequently selected answers

No	Questions	Video feedback average (27 students)	Text/image feedback average (26 students)
1	The video/text was too long.	2.8	3.1
2	The video/text was boring.	2.8	2.9
3	I have understood the given material very well.	3.7	3.6
4	There were many technical words that were too difficult to understand.	2.3	2.4
5	I have learned many new words.	2.4	2.7
6	It was difficult for me to answer the questions about AMOLED displays.	2.8	2.7
7	It was difficult to translate the terms from Serbian into English.	2.4	2.3
8	I liked the material we were doing in class.	2.9	3.2
9	I liked the activities I was asked to do.	2.6	3.0
10	These exercises were useful.	3.2	3.4

Individuals in the video group assessed the video material as reasonably long and motivating enough. They stated that they could understand the video very well

and that it was neither easy nor hard to answer the comprehension questions. Their opinion in general was that the technical words could be understood and translated without any particular difficulties. Also, they mentioned that many of the technical terms were already familiar to them. This could be the only negative comment, but justification for this kind of answer can be found in the clear and concrete language presented in the video supported by the visual stimuli that contributed to a better understanding of the study material. Also, the students said that they were not overwhelmed with the activities they were asked to do in class, but they did not say that the material and the exercises were boring or useless. Most students gave a comment in the personal opinion box that the language experiment was interesting, and only one student protested against advertisement use in class due to its influence on the opinion of students as buyers of this kind of equipment.

Individuals in the control group, on their part, thought that the text was of moderate length and stimulating enough. They said that they could understand the text and answer the questions with no particular difficulties. They encountered no problems when it came to translating the necessary terms. Again, the students had the impression that there were not many technical words that were unfamiliar to them. The conclusion is that they may have encountered this vocabulary somewhere else, in some other context. However, the material and the activities done in class turned out to be appealing to this group. Most students thought that the exercises were useful, so the language experiment was agreeable to this group as well, which leads to the overall conclusion of this survey that both groups of participants were satisfied with the given material and the activities they were doing in class.

In addition, the analysis of the questionnaires for the video and text/image groups showed that the students had very high opinions of themselves and their performances on the main test, which were not borne out by analysis of the results reported earlier. In reality, it turned out that the students did not have as many problems when it came to translating phrases from Serbian into English as they had with the written part of the test which required them to provide technical explanations of AMOLED, its structure, and functions. Maybe the students were

familiar with the vocabulary, but they could not apply that vocabulary with a concrete purpose to elaborate on the topic. This is probably where the reason lies for the discrepancy between the students' actual scores and their personal opinion on their test efficiency.

For further insight into the two types of teaching materials, a group of 17 students from the Industrial Engineering department were also asked to give their personal opinion after reading two professional texts on AMOLED and then watching the video during their ESP class. The idea was to allow them to express their opinions and make comparisons between the two types of resources: the video and the texts. They were asked to write down their impressions on a piece of paper, stating which mode of instruction they preferred and why.

Almost all of their comments were in favour of the video, implying that: (1) it is not as boring as the text; (2) it contains more information; (3) it explains the subject-matter in a better way; (4) it is more effective since it consists of a picture, text, and sound; (5) it is easier to grasp; and (6) it allows for better retention of language elements. One student also mentioned that he/she could easily identify with the video. The analysis of this evaluation has thus shown a great response of the students towards video materials, which are seen as very motivating and useful tools for studying the target professional language.

6. Conclusion

This paper has reviewed research on the role of video materials in facilitating ESP learning by improving the retention of facts, making classes more appealing, and contributing to the ESP environment by promoting and using authentic language. All of these features of AVRs are possible due to the fact that AVRs “create a concrete basis for conceptual thinking” (Ode, 2014, p. 198), and “make abstract ideas more concrete to learners” (Ode, 2014, p. 195) while also allowing learners “to develop a holistic understanding that the words cannot convey” (Ramírez,

2012, pp. 20-21), encouraging students to process language information more easily and participate in authentic communication and production.

The paper reported on a small case study carried out as part of an initial needs analysis for the first year ESP classes in technical sciences programmes. A comparison of instructional materials based on video or text has shown that even after a single use in class, video resources appear to be more popular and marginally more effective than text-based teaching materials. Since this was only a small-scale study, additional research is of course necessary to support these tentative findings that students exposed to AVRs may achieve better results in comprehension exercises than the students who were instructed by traditional methods and may have an advantage in both comprehension and language production. The study confirms previous research suggesting that students find video materials a much more pleasing and effective type of learning resource than exclusively written resources. Further research involving more students, longer interventions, and a variety of pedagogical materials and evaluation methods would allow stronger claims about instructional effects in relation to pedagogical resources in this area of ESP teaching and thus offer more insights into the effectiveness of video resources in technical science contexts.

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