

INTERACTIVE METHODS OF TEACHING DIGITAL SKILLS AND PRESENTING PROFESSIONAL OPTIONS FOR STUDENTS IN PRE- UNIVERSITY TECHNICAL EDUCATION

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Abstract

At the beginning of the high school cycle, it was considered necessary to carry out a first evaluation of the competences regarding the elementary knowledge accumulated during the on-line learning period. Following the discussions with other members of the teaching staff, it was considered appropriate to introduce interdisciplinary exercises that would fill the existing gaps both within the information technology and communications subject, as well as regarding other subjects existing in the curricula. By means of a questionnaire, a general assessment of general skills is carried out considering aspects related to verbal and written communication, basic mathematical concepts, digital skills, etc., as well as specific topics in the field of IT&C: self-assessment regarding the level of digital skills and the use of digital tools in the educational process, the correct use of on-line resources and different information channels regarding the educational and professional course, presentation of professional options and certifications useful in carrying out the labor activity.

Taking advantage of the dynamic and interactive nature of on-line resources and alternatives of e-learning, the exercises developed during the laboratory hours were aimed to provide extracurricular information and activities. These would contribute to the general motivation of students to easily promote the existing subjects within the school program. As a conclusion of the study, the digitization of the education system represented the opportunity to adapt to a new teaching-learning context. In this case, it is mandatory to analyze to what extent the use of digital tools and resources allowed the assimilation and sedimentation of the already existing knowledge and the creative presentation of other subjects studied within the entire school program.

Keywords: digital skills, information, technical profile, on-line resources, e-learning, secondary education

1 INTRODUCTION

In light of two Pandemic years and on-line schooling, the Romanian Education System was forced to a major switch, from a profoundly traditional education to digital techniques learned by teachers and pupils alike. If this aspect was not an issue in several urban schools, on a general level, especially in rural areas and low-income periphery areas, the transition often implied school abandonment, drawbacks in teaching and learning due to lack of hardware, software and digital skills (Edelhauser & Lupu-Dima, 2021). Quick actions were mandatory to continue the educational process in as much schools as possible, so even resources were scarce, Romanian teachers adapted by finding handy solutions using any method available to overpass the challenging period (Holotescu et al., 2020).

The current research focuses on the impact that digital tools have on the educational act, namely the identification of the gaps that exist in terms of acquiring elementary skills after the on-line education period (Jackman et al., 2021; Nicolau et al., 2020). Therefore, in the first phase, the study consisted in evaluating the knowledge of the students of the Automobile Transportation High School from Timișoara, having as a target group a sample of over 11 classes with a technical profile. The challenge of the study starting from the existing deficiencies in terms of basic skills within the target group and how digital tools and on-line resources allow these impediments to be overcome.

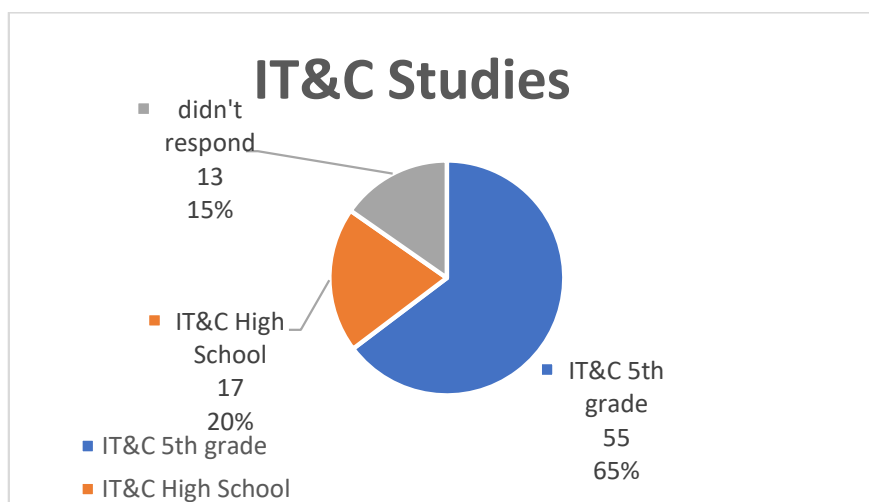
Considering the various social problems (poor class attendance, lack of financial resources and a stable family environment) and age-specific aspects (identity problems, lack of attention and motivation) in the case of the targeted study group, a brainstorming was carried out together with other teachers. The goal was to understand the current situation and the options that exist from an educational and professional point of view for the students of the Automobile Transportation Technical High School. Following these preliminary discussions, some main themes were foreshadowed which were later synthesized in the form of a questionnaire, used as a data collection tool for further analysis and the creation of other materials.

2 METHODOLOGY

The current research focuses on the impact that digital tools have on the educational act, namely the identification of gaps that exist in terms of elementary skills. Therefore, the first phase of the study consisted of evaluating the general knowledge of over 100 students enrolled in the Automobile Transportation Technological High School in Timișoara, Romania. More than 85 completed forms were collected, with the number of responses varying depending on the specific questions. The target group consists mainly of social cases that aim to obtain a professional specialization in parallel with the acquisition of elementary skills at the end of the 10 mandatory classes, with the possibility of extending the study period in the evening hours in order to prepare for the Bacalaureate exam.

The questionnaire carried out in this study represents an exercise that considers the awareness of one's own progress, a self-evaluation, as well as pointing out possible directions for further analysis. The goal was to determine the digital skills of the high school students in order to adapt the existing curricula to their individual needs. The questionnaire itself is a series of 30 items starting from the general context, up to specific situations. As an example, the first question is since when did the respondents started studying the subject of information technology and communication (*Figure 1. Beginning of IT&C Studies*), and what is the number of hours dedicated to different applications and on-line resources in a week (*Figure 2. Usage of on-line resources*).

Designed as an initial knowledge and assessment exercise, the questions refer to the degree of familiarity with digital tools, both in terms of hardware and software aspects, as well as the time spent on various on-line resources. Starting from these initial data, worksheets and didactic activities were further created to meet the educational needs of the different classes. The purpose of the exercise is to organise the time dedicated to study more efficiently by introducing these digital tools in the entire educational process. Another activity that was pursued consisted of presenting existing professional options, as well as motivating the students to fulfill their entire potential by getting involved in different study groups and local initiatives.



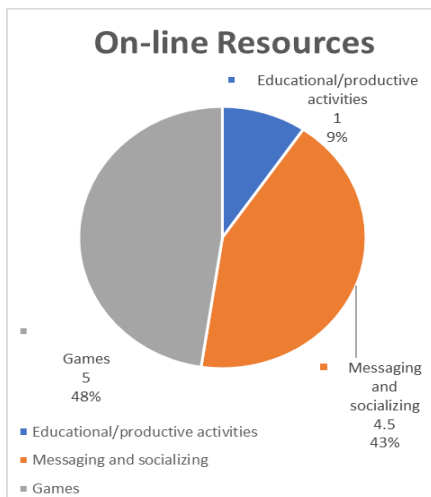


Figure 1. Beginning of IT&C Studies, since 5th grade until High School

Figure 2. Usage of on-line resources including type of activities and applications used

3 RESULTS AND DISCUSSIONS

More than 64.70% (55 respondents stated that they started studying information and communication technology since the 5th grade, the beginning of secondary school), while the remaining 20% (17 respondents) answered that they started studying IT&C in High School. A percentage of 77.65% of those interviewed (66 respondents) declared that they were familiar with digital tools, giving themselves a rating of approximately 7 in terms of using them on a daily basis. According to these initial findings, it can be concluded that the respondents are familiar with digital tools, used in different forms and time intervals, as shown in Figure 4. Daily usage of Digital Tools:

- Personal computer (the 38 respondents stated that they use a P.C. around 3.5h/day)
- Tablet (the 18 respondents claimed to use a tablet around 1.5h/day)
- Smartphone (the 18 respondents stated that they use a device around 8h/day).

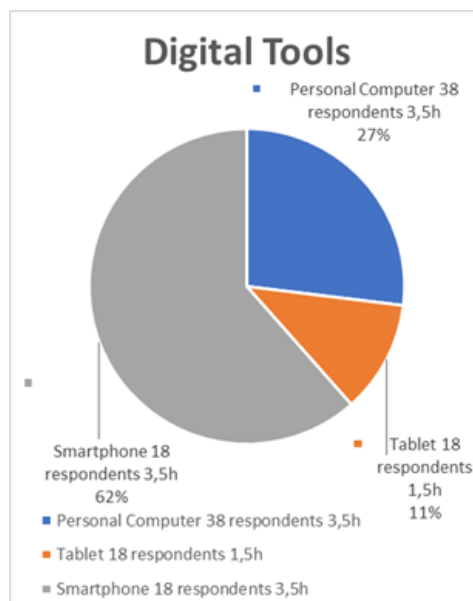
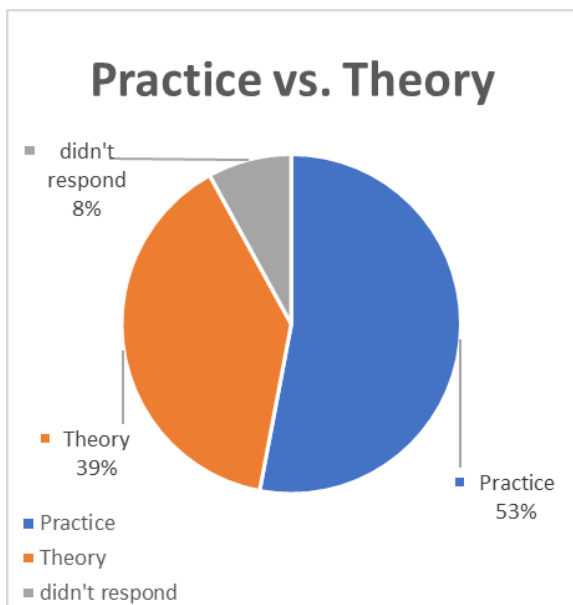


Figure 3. Distribution of existing courses into practice and theory according to the technical profile

Figure 4. Daily usage of Digital Tools of the respondents

From a percentage point of view, 9.52% of the time spent using digital tools is allocated to educational or productive activities, while the time interval dedicated to social networking applications and games is

between the values of 42.86% and 47, 62% (4.5h and 5h, considering the maximum values, illustrated in *Figure 2. Usage of on-line resources.*). This study was carried out based on quantified statistics using the applications intended to monitor the time spent using smartphones, as well as on the basis of personal estimates regarding the time allocated to other digital tools (P.C.s, tablets, etc.), shown in *Figure 4. Daily usage of Digital Tools.*

Regarding the familiarization with the elementary notions of hardware and software components, the 75 respondents self-assessed themselves with a grade of approximately 5.3, considering it appropriate to repeat these topics during the initial classes before continuing with the proposed subjects. In terms of software usage, the interviewees stated the following:

- Approximately 71.93% of respondents know how to install an operating system
 (Percentage obtained considering the 57 respondents): Figure 5.
- 72.55% of those interviewed know how to install drivers and other basic programs needed to use digital tools (considering the answer given by 51 respondents): Figure 6.
- 77.78% of the 45 respondents know how to install the programs they frequently use: Figure 7.

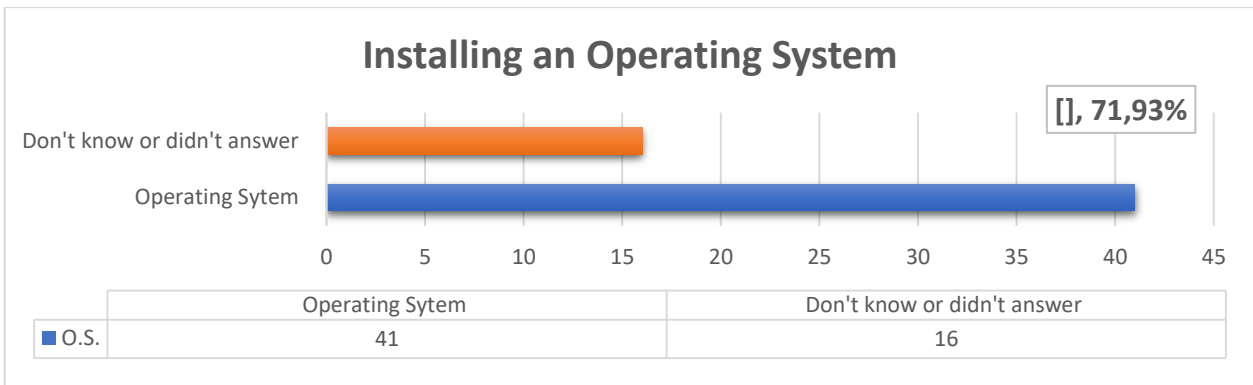


Figure 5. Ability of installing an Operating System

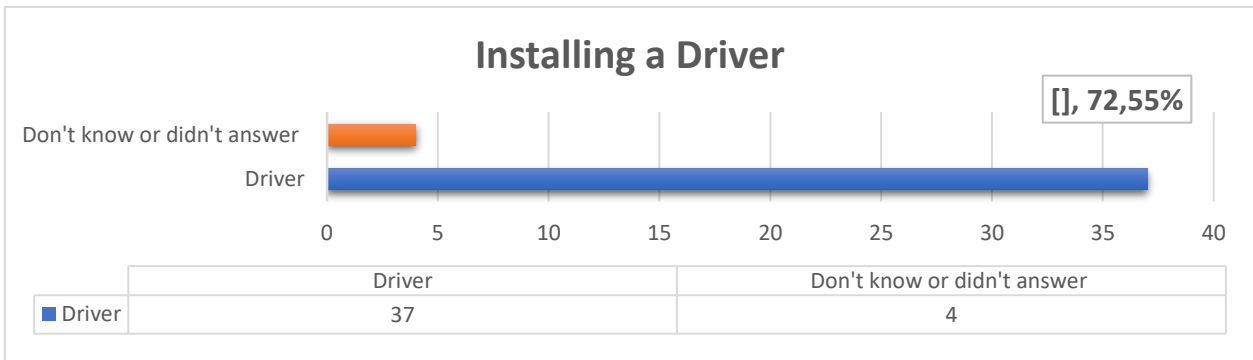


Figure 6. Ability of installing a Driver

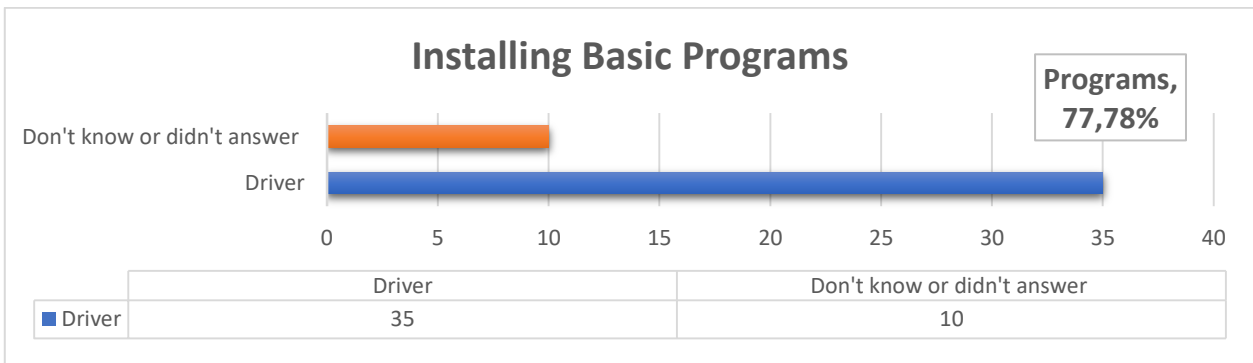


Figure 7. Ability of installing basic programs

The statements listed above were considered the most common encountered situations, because of the large number of affirmative answers regarding the skills needed to install the various software. These results indicate a high degree of familiarity with the everyday use of digital tools. However, it was considered necessary to review these basic notions to consolidate the digital skills acquired and for the purpose of preparing one-self to take some national or international examinations (the example of digital skills included in the Baccalaureate exam or the ECDL exam - European Computer Driving Licence).

Regarding the degree of satisfaction of students in terms of information technology and communication classes, only 13.33% out of the 75 respondents declared themselves dissatisfied with the curriculum related to the subject. The rest of those interviewed observed the usefulness of this discipline in terms of acquiring the digital skills necessary to obtain the Baccalaureate exam or other certifications. At the beginning of the High School cycle, it was considered appropriate to adapt the subject IT&C in accordance with the specific requirements of the technical profile. If until this moment, several applications and platforms necessary for on-line education have been used (Google Classroom, Microsoft Office, Brainly, etc.), other software used in the professional field, such as those of technical drawing, were presented. If the students registered for the daily education courses are more interested in applications and software related to photo and video processing, among the students who are already integrated into the labor market or attend classes only after 18:00, the digital resources used are mostly aimed at processing databases, text editing, data registration in the system, etc. Consequently, considering the 2 important groups involved in the study, a differentiated assessment of the 2 categories of students was needed (for example, a differentiated review of the basic notions related to the Microsoft Office package):

- For the students enrolled in daytime classes, a worksheet was created to consolidate the knowledge related to editing text and tables. The organization of the educational process was presented in terms of an exercise regarding the distribution of time dedicated to various subjects and activities.
- Review of text editing skills through a presentation of the applications used for professional purposes, thus consolidating the existing knowledge through a practical and useful exercise.

Also, it was considered necessary to present the options available after finishing the High School cycle, acknowledging the fact that a continuity of study is necessary, what are the steps to be followed for graduating and taking the Baccalaureate exam, etc. On the same subject, existing language certifications are presented, the possibility of doing internships both in the country and abroad, respectively the option of continuing higher studies in a technical field. Therefore, it was considered important at this stage to present preliminary information regarding the various existing training options, what are their particular requirements, at the same time being aware of the subjects related to the chosen technological profile (practical matters, specific courses of technical drawing and mechanics, hours of practical training, etc.).

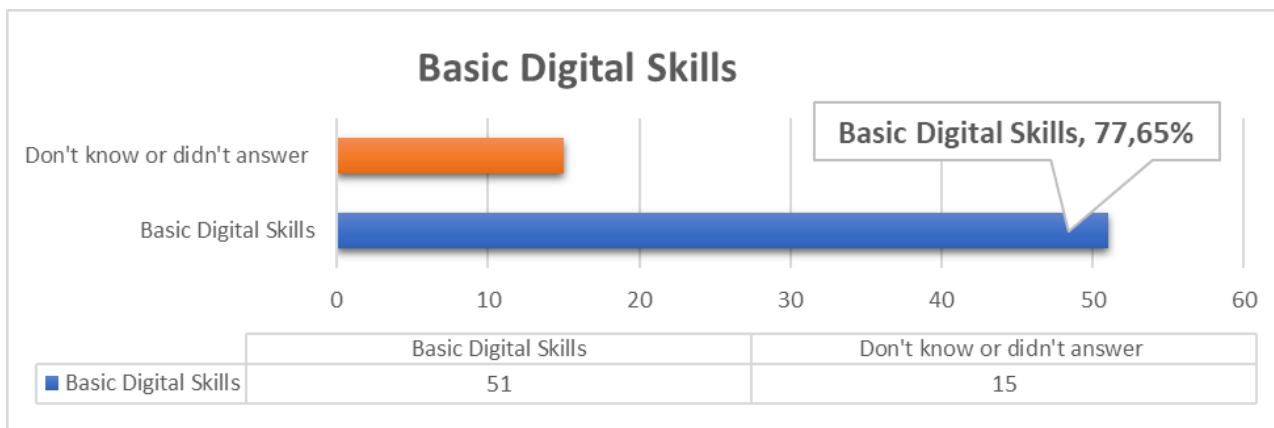


Figure 8. Self-Assessment of Basic Digital Skills.

4 CONCLUSIONS

The current study started from the need to carry out an initial assessment regarding the use of on-line resources and digital tools as a result of the first contact with High School students. According to the answers of those interviewed, it was found that the lessons were to be carried out through practical exercises: out of the 53 respondents, 39 opted for applications, made in the laboratory lessons, taught in an interactive way. Through this study, an attempt was made to define the learning-teaching difficulties found following the e-learning courses carried out during the pandemic. The purpose was to evaluate the level of

elementary knowledge accumulated in terms of specific subjects in the field of information technology and communications (definition of the targeted digital skills, self-assessment in terms of using digital tools, available on-line resources, common projects that combine interdisciplinary topics, etc.).

Although more than 70% of those interviewed declared that they have the basic knowledge regarding the daily usage of a computer (as shown in *Figure 8. Self-Assessment of Basic Digital Skills*), gaps were found regarding the digital skills that are tested during the Baccalaureate exam, for example. Through this study, a first analysis was carried out regarding the current level of digital skills and the specific needs to be taken into account regarding the subsequent presentation of the information and communication technology subject. On this occasion, a preliminary information was provided regarding the educational course within the high school cycle, as well as the usefulness of these subjects in the development of the student's future professional activity (certifications in the context of the digitalization of industrial activities).

Therefore, from the point of view of digital skills, the pandemic period has allowed the introduction of alternative teaching-learning methods through on-line resources, but the need for direct contact during laboratory hours is still present. This results from the increased interest given to interactive e-learning methods, respectively the improvement of performances following direct contact with teachers and with fellow students. Worksheets, as well as digital tools and on-line resources were used as pedagogical tools, thus introducing the concept of blended learning, carried out both individually and in groups of students, under the guidance of the teaching staff. By means of these exercises, connections were made between several subjects included in the school curriculum (written and verbal communication, digital skills and elementary notions of mathematics), allowing the educational course to be organized according to specific needs and demands.

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