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The Flipped Classroom

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Abstract

The knowledge society requires greater connectivity between individuals and communities. Becoming indispensable for the development of all human activities, the new information and communication technologies are increasingly encountered in the educational practice. Essentially, "flipping the classroom" means that the students are initially exposed to new materials outside the classroom, usually by presenting informational content or videos and then use their time in the classroom to do the harder work, assimilating this knowledge by solving problems, discussions or debates. Starting from the specificity of the flipped classroom, we have proposed to test the views of the students enrolled in the Department of Teacher Training of the University of Craiova, on this subject. By applying an opinion questionnaire, we obtained information about two indicators we referred to: the extent to which the students know the characteristics of the flipped classroom and their attitude regarding the implementation of this approach. For a better "radiography," we turned to the SWOT Analysis and disseminated the resulted information in order to implement this form of mixed learning in the activities with the students of the Faculty of Sciences, enrolled in the module of psycho-pedagogical training.

Keywords: Flipped Classroom, Just-in-Time Teaching, Peer Instruction, Technology, Constructivism

1. Introduction

Education is constantly adapting to meet the needs of the students. Communication Technologies (ICT) are meant to support learning and teaching: universities started providing free wireless access to the internet, students are communicating with teachers via e-mail, bringing their laptops to classes to conduct on-going research and perform tasks. The use of technology allows lectures to be pre-recorded and made available to students outside the classroom. The phrase "New Information and Communication Technologies" (NICT) refers to the tools and resources needed to store, organize, process and present information and includes a computer, multimedia systems, and the Internet. They influence how education and training are delivered and generate a range of educational platforms.

An attempt to define eLearning from a technological point of view is the one to analyze the relations between eLearning and certain correlative concepts: Internet learning, Web-based learning, online learning, computer learning, etc. If e-Learning is based on collaborative learning, m-Learning is based on situational learning. M-Learning learners can choose the moment they want to connect and access educational resources. The Digital Teaching Platform is a new set of educational products designed to operate in a teacher-led classroom that provides solutions to technologize the learning process and to manage educational learning. For example, the Perusall Social Learning Platform, developed at Harvard University, allows learners to annotate their readings

and respond to the comments and questions of the other students about the texts presented. Perusal is expanding the collective experience, by allowing students to get immediate answers to their questions, to learn more, to interact and prepare at their own pace. They engage, become proactive, and the teachers provide customized guidance, easily succeeding in motivating the entire class/ group. Online courses are often conducted through the course management systems such as Blackboard or Moodle that provide a customizable access gate. Learning management systems, such as Massive Open Online Courses (MOOCs), are increasingly sought after. A massively open online course is an online course aimed at the participation and wide access of learners from different geographic areas, through web and interactive methods.

The flipped classroom has common elements with the *virtual class*, both using technology. For example, mobile devices can support learning in a university context, in a flexible manner and in a variety of educational. *Hybrid courses* that are met in university and postgraduate education are becoming more and more common. *Blended Learning* is an effective combination of face-to-face education and online education. It should be noted that this is not limited to the implementation of technology in the use of old content. It is, in fact, a "fundamental reconceptualization and reorganization of the teaching and learning dynamics, starting with various specific contextual needs and contingencies (e.g., discipline, developmental level, and resources)" (Garrison & Kanuka, 2004). As blended learning does, *the flipped classroom* capitalizes on the constructivist principles. Flipped Learning transforms the time spent in the classroom into an individualized experience. The learners work at their own pace or in small groups in order to apply their knowledge in practical situations, and this allows, as a whole, a more diverse experience. The "flipped" concept is based on the theory of constructivist learning and offers the active learning environment additional benefits because teachers can use modern technology to engage in the learning process of the students.

The idea of flipped classrooms appeared in a 1993 publication by researcher A. King called "From Sage on the Stage to Guide on the Side." Although the author does not directly illustrate the concept of "flipping" a classroom, he emphasizes the importance of using the time available in the classroom to construct meaning, rather than to transmit knowledge: "Essentially, the professor's role is to facilitate the students' interaction with the classroom material and with one another in their knowledge-producing endeavor. In the constructivist model, the student is like a carpenter (or sculptor) who uses new information and prior knowledge and experience, along with previously learned cognitive tools (such as learning strategies, algorithms, and critical thinking skills) to build new knowledge structures and rearrange the already existing knowledge" (King, 1993).

Since the founding of the Khan Academy, the flipped classroom has been paid increasing attention. The US professor S. Khan set up in 2006 a video channel where he published videos to help students in the learning process. In accordance with this model, he set up the Khan Academy which, for some, has become synonymous with the flipped classroom. More and more universities are turning to recording their lectures, broadcasting them in closed networks and distributing them on the Internet. This is encouraged by the fact that many students have personal computers, notebooks, tablets as well as mobile phones or other portable devices for viewing them. In the flipped classroom other tools such as "Nearpod" (a tool that allows engaging in interactive activities - surveys, questionnaires, collaborative counseling), "Playposit" (an interactive video tool – more effective than the standard video - focusing on an uninterrupted workflow, student engagement, performance tracking), "BrainPOP" (an animated learning site for students that can be used as a support for teaching a variety of fun animated topics).

Podcasting is a method of distributing files on the Internet as multimedia (audio and video) through Web-Feed technology and specific content formats. This involves downloading a series of audio (files) to a digital media player via a computer for a few weeks. Public acceptance of podcasts is reflected in recent grants and reflects the desire to modernize the training act. Although there is little research on the use of video podcasts in education, the interest is growing. You can observe that "new portals such as the Khan Academy, exclusively designed to distribute work-example video podcasts, have been extensively used" (Kay, 2014, p. 21).

The American professors J. Bergman and A. Sams have realized that sick students, who can not attend classes because of this, do not have the opportunity to get curriculum material. In 2007, they began recording lessons and turned teaching (lectures, readings) into videos. Then they began to use the material in classrooms, calling it "pre-broadcast." On this algorithm, the flipped classroom model was officially used in 2010 at Clintondale High School in Michigan, where the dropout rate was very high. All of this lead us to the idea that the flipped classroom is one of the latest trends in education. In this mixed learning approach, face-to-face interaction is combined with independent study with the help of technology.

2. Literature Review

2.1 *Opportunities to valorize technology in education*

The generation of digital natives is distinguished by its own identity. The Net Generation is unique in that its representatives feel very comfortable with technology, thanks to their early familiarization with it and its intensive use: "Our students today are all *native speakers* of the digital language of computers, video games and the Internet" (Prensky, 2001, p. 1). This reconsiders the way the training is done and invites to reflection and search for new pedagogical solutions that would take into account the specifics of the present society. In the field of education, intelligent technology supports constructivist and student-centered learning. Web-based learning technologies offer powerful opportunities for learning activities in the classroom and outside the classroom.

There are several differences between *traditional learning* and *e-learning*. The first relates to a linear and predefined organization of the pedagogical path and has no immediate link with the operational activities; the second is aimed at an adaptive progression for each one, depending on the situation and which is integrated with the operational activities (Marinescu, 2007, p. 78). In traditional learning, the results are the ones that matter, while in e-Learning, the interaction process is considered more important than the results (Dillenbourg, 1999; Mercer & Howe, 2012). The first encourages more competition; the second is more collaborative, supported by mobile technologies and tools (e.g., Moodle). If aspects of planning, monitoring, and evaluation are the teacher's attribute in traditional learning, in e-Learning these include the student, too, and can be seen as part of their socio-emotional development (Volet, Summers, M., & Thurman, 2009). If the content was important before, it is now a pretext for training.

In the postmodern view of pedagogy, the constructivist approach is a paradigm that is gaining more and more ground. Being open to postmodernity, to renewing, but also to deconstruction and reconstruction, pedagogy entered – also through constructivism – a new stage. *Constructivism* activates innate curiosity, engaging in experimenting with concrete situations of life, reflecting on reality and drawing out partial and general conclusions. It is appreciated that if from a behavioral perspective the objective of education is "to ensure the survival of the human species, societies and individuals", the constructivist position states that "learning is a process of building meaning; this is how people give sense to their experience" (Merriam & Caffarella, 1999, pp. 252-260). *Constructionism* complements constructivism by emphasizing the relationship between the mental dimension of knowledge and the material dimension. The mental one ensures the understanding of the problem, the situation, and the material one concretises a representation of the model built internally, abstractly, in the form of an artifact product, which gives a relative, artificial image or a description of the mental construction.

Education takes place in a climate that encourages, presses, or requires teachers to change their teaching styles and even their fundamental beliefs about effective teaching. Beyond the obstacles encountered in the practical use of constructivist strategies (there is no resort to stimulating effort, attaining higher levels, often finding resistance from teachers and/ or students, requiring training time and a flexible, modular instructional design, etc.), they teach students "how to learn." Experiments, research projects, excursions, debates, case studies, modeling, computer-aided instruction give meaning to learning experiences and attract students, helping them to become active subjects of their own training. The constructivist methodology includes, as a stage, in the spiral of knowledge and in the rethinking, restructuring, remodeling according to different criteria, sometimes other than the ones that the cognitive construction followed. Even though the technology used in the adaptive learning

process is still young, the interest in adapting technology to the training needs is increasing. The learning methods are at the heart of each adaptive education system as one of its most important elements. Open learner models (OLMs) are accessed by learners on the basis of modern technology, and they allow the adaptation to the individual, according to their current learning needs.

In 2009, Intel realized that the employees are using their own devices, such as laptops, smartphones, tablets, connecting to the corporate network, which increases productivity and reduces costs. Since then, the BYOD approach has gained popularity in the business world in other areas such as education, too. In the context of education, *M-learning* and *Bring Your Own Device* (BYOD) are conceptually similar, but each has a different percentage in terms of availability. BYOD focuses primarily on the use of a personally owned mobile device and its associated technology to facilitate personalized learning (Afreen, 2014; Kong & Song 2015; Lai et al. 2013, apud Cheng, 2016, p. 1).

Adaptive learning – or adaptive teaching – is the delivery of custom learning experiences that address the unique needs of an individual through just-in-time feedback, pathways, and resources (rather than providing a one-size-fits-all learning experience). Adaptive learning involves adapting to different situations to bring about a permanent change in behavior. Adaptive learning or smart guidance has its origins in the artificial intelligence movement and gained popularity in the 1970s. Introduced at the end of 2012 by the World School Council (London), adaptive learning was rapidly deployed in various educational systems such as intelligent tutoring systems and computerized adaptive testing. Today, computers adapt the presentation of educational materials according to the students' learning needs. The adaptive learning systems were traditionally divided into separate components or "models" (e.g., the experts' model, the students' model, the training model, the instructional environment model). The learning materials or training courses designed to teach new concepts usually have a hierarchical structure, and adaptability can be introduced at different levels of this hierarchy. The adaptive training of the learning content requires more than just channeling traditional content into a single route.

Active learning involves approaching learning based on the students' engagement in learning. Active learning refers to a wide range of teaching strategies that turn students into active participants in their own learning during classes with their instructor. This is related to *collaborative learning* – a pedagogical approach that involves the active participation of the students and which allows the assumption of responsibility in learning, improving critical thinking skills, and encouraging reflection.

Lately, smartphones and tablets have become a catalyzer for creating an active learning technology. The interactive activities based on technology allow students to solve problems and engage in discussions, collaborating in an entertaining environment (Gee, 2005; Cullen, Harris, & Hill, 2012). Most students today are younger than Google and have developed their first school project on Wikipedia. That is why we believe that the current generation of students requires advanced interactive approaches based on the exploitation of technology. Because screens are the tools of everyday life, educators can turn them into learning tools.

Active engagement includes taking notes, gathering information, or highlighting key phrases. It combines with a constructive engagement (e.g., writing an essay or solving a problem independently) and with an interactive participation (e.g., solving a task with a tutor or co-building with a colleague). All these are based on the principles of constructivism, which do not give up the active role of the teacher but only modify it, involving students more in the instructive-educational activities.

The flipping pattern, for example, requires students to be active agents of their own learning, not to rely on the teacher's expertise exclusively. The students' participation is also essential when creating video podcasts with working examples. The students work more on issues where information is presented in a conversational manner (Beck, McKeown, Sandora, Kucan, & Worthy, 1996). Of course, there are a number of aspects that contribute to the positive impact a video can have: the length of the clip, the presence of explanations, the essentialization of the information presented, the provision of examples, applications, case studies, etc. Active learning is associated with the depth of learning, with the process during which the students develop a personal understanding of the material, rather than just keeping the knowledge.

2.2 *The flipped classroom*

Flipped Learning is a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter. The conventional notion of learning is rethought so that students are familiar with the learning material before class interaction.

Classroom time is used to deepen understanding through discussion with colleagues and solving problems with the help of the teachers. The phrase "flipped learning" came into general use a decade ago. It was popularized by the chemistry teachers from a Colorado high school, who offered sick students the opportunity to watch recorded lectures and participate in video conferences (Bergmann & Sams, 2012).

The Flipped Classroom is a mixed form of learning where students learn the content online by watching video lessons, usually at home, and homework is being held in the classroom, with the teachers and students discussing and solving problems. The teachers' interaction with students is more personalized, with guidance instead of teaching. The term "flipped classroom" was used by a group of economics professors at the University of Miami (Ohio) to describe the use of the technique (Lage, Platt, & Treglia, 2000). In the flipped classroom, the students are given the opportunity to negotiate and build meaning.

There are several ways of "flipping" the classroom. For example, through its structure, JiTT is closely linked to the flipped classroom method, according to which the learning activities that traditionally take place within the classroom are taught outside. *Just-in-time teaching* (JiTT) is a pedagogical strategy that encourages students to prepare for classes and allows instructors to set up the classroom activities to best meet the students' needs. JiTT differs from "reading quizzes" in that students do not use the classroom time, the learning tasks are solved online with open and challenging questions. JiTT was originally developed at Indiana Purdue Indianapolis University (IUPUI) and the US Air Force Academy to help the students and the faculty of physics. Developed by G. Novak and colleagues, JiTT is based on a feedback loop between the web and classroom learning materials (Novak, Patterson, Gavrin, & Christian, 1999).

Peer Instruction is peer education. E. Mazur invented the term "peer education" to describe a particular technology-centered pedagogy. A professor of Physics at Harvard University and a pioneer of the flipped classroom, he encouraged his colleagues to rethink the evaluation and lead it to a higher level. In the 1990s, he developed a model of "peer education," in which he offered material for the students to prepare and reflect before the course and then use courses to encourage deeper cognitive thinking. He called this path of learning "just in time teaching" (Crouch & Mazur 2001). At present, the method is a subject of continuous training at summer schools that are organized and carried out around the world.

The flipped classroom is similar to other methods that encourage learning outside the classroom. In the team learning process developed by L. Michaelsen, the students receive reading tasks before the course, and then they are faced in the class with individual tests, group tests, and finally with case studies (Michaelsen 1992; Michaelsen, Knight, & Fink, 2002). The "Flipped Classroom" model uses student-centered teaching. The flipped classroom aims to reverse the roles. The active role is for the students, and the teacher becomes a guide, mentor, facilitator. The flipped classroom is a mixed learning model where traditional ideas about classroom activities and homework are "inverted" or "overturned." The principles of the flipped classroom have been successfully applied in several Universities (e.g., Vanderbilt University in the USA, the University of Queensland, Australia). C. Wieman and his colleagues also published evidence that the flipping of the classroom can produce significant learning gains (Deslauriers, Schelew E., & Wieman, 2011).

In a study by A. Kazlauskas and K. Robinson in 2012, nearly a fifth of the students preferred to attend the face-to-face conference. These students felt they could concentrate better, absorb more in face-to-face courses, and felt less isolated than they were when studying podcasts. These results tell us that we need to take into account the differences between learners in assessing different learning scenarios. We need to make

it clear that there is also some restraint in this mixed form of training. Some studies (Traphagan et al., 2010; O'Bannon et al., 2011; O'Callaghan et al., 2015; Giannakos and Vlamos, 2013) show ambiguous results. In a study by Traphagan et al. (2010), the students who had access to lecture-based conferences as well as to face-to-face lectures were not different from the achievements of the students who only had access to face-to-face lectures (apud Luttenberger et al., 2018). These studies are accompanied by others that observe the existence of some vulnerabilities: technical difficulties, the isolation feeling (Youngberg 2012), the skepticism and suspicion of teachers (Fulton, 2012), the resistance of the students to the assumption of increased responsibilities, cultural differences (Talbert, 2012), and others, the uncomfortable state that some students may experience in using the technology-based approach (Herreid & Schiller 2013).

In order to gain a more in-depth knowledge of the flipped classroom, we appeal to identifying the advantages and limitations of this mixed form of training that valorize the new technologies:

Table 1. Advantages and disadvantages of the flipped classroom

<i>Advantages</i>	<i>Disadvantages</i>
<ul style="list-style-type: none"> • All students are involved in the learning process; • The content of the information is kept permanently; • It improves the understanding of the learning process in students; • It combines direct teaching with constructivist learning; • Collaboration is encouraged, and the interaction between the students and the teacher increases; • Personalized learning is increased; • It allows learners to divide content into smaller and more manageable sequences, which can be repeated whenever it is desired; • It leads to better learning outcomes; • The teachers can quickly assess the understanding of how students learn; • The students assume responsibility for their own learning; • The students have the opportunity to run, rerun, interrupt and speed up the reading of the informational material; • They avoid remaining behind because information can be accessed online; • Their time in the classroom can be used more efficiently and creatively; • There is the possibility of asynchronous learning. 	<ul style="list-style-type: none"> • Many parents accuse the excessive use of computers and the Internet; • The lack of motivation of the students to solve their tasks; • The dependence on the learner's skills in assessing and evaluating the learning content; • The lack of human interaction; • The increased time spent in front of the computer at a time when teenagers and young people spend too much time in front of electronic screens; • The teachers' resistance to change and to the new; • The lack of adequate evaluation strategies for this strategy; • The teachers' time load; • The failure of some learners to solve work tasks based on recorded content; • The lack of Internet access or poor Internet access outside the classroom; • The difficult assessment, given the fact that the students will approach the tests at different times, and some may even postpone the evaluation process; • The inappropriate use of technology; • The promotion of an environment voided of education.

Virtual reality is one of the latest innovations that requires the reconfiguration of the variables of the educational process. Beyond the uncertainty of the use of videos in education, the implementation of technology in school is inevitable and rethinks how teaching, learning, and evaluation are being achieved. The approach of capitalizing on the new information technologies begins with the awareness of their specificities, their advantages, and their limits. As technology advances, teachers become more creative, and the flipped classroom is an answer to the questions about the modernization of the instructive-educational process.

3. Methodology

In our observational research, we start from *the premise* that the instructive-educational process is influenced by new information technologies. *The purpose* of our investigation is to test the opinions of students enrolled in the Department of Teacher Training at the University of Craiova (DPPD) about the flipped classroom. The research took place at the University of Craiova, in the academic year 2018-2019, during the second semester.

The group of subjects was represented by students of the first year of the Bachelor's degree course, from the Faculty of Sciences of the University of Craiova. They were selected from among those who had shown willingness to participate in the research, but also interest and concern to improve their initial training, those who were able to capitalize on the advantages of modern technology.

Table 2. The number of subjects included in the research

<i>Nr. of students/ Departments</i>	<i>The Department of Mathematics</i>	<i>The Department of Informatics</i>	<i>The Department of Chemistry</i>	<i>The department of Physics</i>
134	38	23	42	31

The students who completed the questionnaire come from different living places: urban (93 – 69.40%) and rural (41 – 30.60%). We used the survey questionnaire as a *research tool* and took into account, in the SWOT Analysis, the answers of the students participating in the research. By wanting to know the students' views on this topic, we formulated the questionnaire items by reference to two variables: the extent to which the students know the characteristics of the flipped classroom and their attitude regarding the implementation of this approach.

The items of the questionnaire are the following:

1. *Do you know the meaning of the flipped classroom?*
 - a) *Yes*
 - b) *No*
2. *In what context did you hear about the flipped classroom?*
3. *Have you participated in activities that are specific to the flipped classroom?*
 - a) *Yes*
 - b) *No*
4. *What are the main two advantages of teaching in a flipped classroom?*
5. *What disadvantages do you consider teaching to have in a flipped classroom?*
6. *The introduction of the flipped classroom in the instructional-educational approach is:*
 - a) *Totally inefficient*
 - b) *Inefficient*
 - c) *Quite efficient*
 - d) *Efficient*
 - e) *Very efficient.*

At the same time, we conducted a needs analysis through which we sought to build the strengths, eliminate the weaknesses, exploit the opportunities, and remove the threats.

Table 3. The SWOT analysis of the flipped classroom in Romania

The SWOT analysis	Beneficial in accomplishing the objectives	Endanger the accomplishment of the objectives
	<i>Strengths</i>	<i>Weaknesses</i>
Internal Source	<ul style="list-style-type: none"> - The opening of the University to new science paradigms and educational approaches - Implement ICT in a modern, attractive and motivating climate for the students - Internet use in curricular and extracurricular activities - The experience of the DPPD members of the University of Craiova in the field of initial teacher education - Exchange of good practices, sharing of experience and successful practices (e.g., Le Projet ANGE – Ancrage du Numérique dans la Gouvernance des Établissements) - Experimenting active and participative training tools based on the principles of constructivism (e.g., grant research project "Cognitivism and constructivism – new paradigms in education") 	<ul style="list-style-type: none"> - Material resources and technical facilities needed to carry out the program at a high level in terms of quality - Insufficient internal and external financing - The competition of adjacent professional tasks - Time limitations for the projection of the activities, the content preparation, and the teaching tasks, as well as of the evaluation tools - The neutral attitude of the teaching staff regarding the implementation of the flipped classroom attributes - The lack of experience regarding the accomplishment of the didactic activity on the coordinates of the flipped classroom - Poor collaboration between teachers from different faculties and departments within the University of Craiova
	<i>Opportunities</i>	<i>Threats</i>
External Source	<ul style="list-style-type: none"> - The favorable national legislation, which stipulates the need for digital competence training - The preoccupation of teachers in pre-university education for the modernization of the instructive-educational act - The possibility to access new information and communication technologies (NTIC) - The international interest in the flipped learning and the flipped classroom - The existence of computer science laboratories in the pre-university education - Most students are familiar with the information and communication technologies (ICT) and can apply them easily 	<ul style="list-style-type: none"> - The lack of research and pilot programs on the need to implement flipped learning and the flipped classroom in the Romanian university environment - The insufficient testing of the new technologies in obtaining a higher rating on learning in students - The insufficient access of the students from Romanian universities to multimedia systems - The low awareness of the local community regarding the role of digitization in education and the implementation of reform measures in education - The resistance to change of some teachers in the university education

After the application of the opinion questionnaire and the group discussions, we managed to outline a SWOT analysis useful for rethinking the initial training program for the students who are training to become teachers. We refer to the design and development of the didactic activities from the perspective of the flipped classroom, which is part of a larger system of measures which DPPD intends to implement. For example, in the 2018-2019 academic year, students were offered an extracurricular activity ("My Education in the Digital Age" – topics: The Flipped Classroom and the Debate). The activity is in collaboration with two other partner universities in Romania ("Ovidius" University of Constanta and the University of Pitesti).

4. Results

Further on, we are going to present the answers to the items of the applied questionnaire. For the first question, out of the 134 students enrolled in the study, only 61 of them (45.52%) answered affirmatively, which means that the rest of 73 (54.48%) do not know the meaning of the flipped classroom.

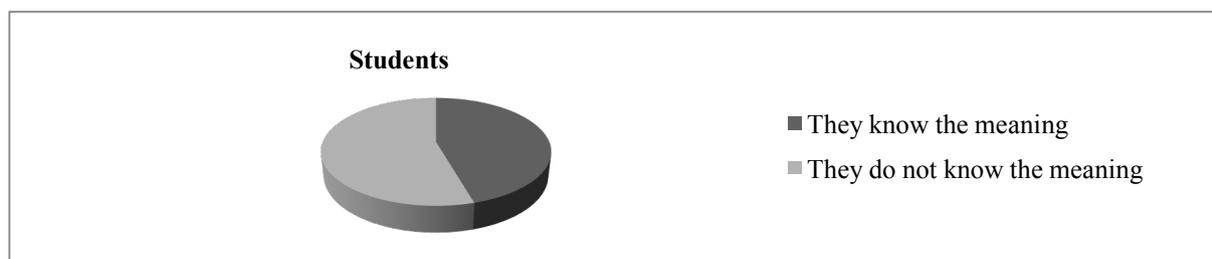


Figure 1. The distribution of the affirmative and negative answers for item 1

Item 2 aims at identifying the context in which the students have heard of the flipped classroom and addresses only those who have specified that they are aware of the flipped classroom. Out of the 134 students, only those who answered affirmatively to Item 1, that is, 61 students (Mathematics – 16, Informatics – 22, Chemistry – 9 and Physics – 14), filled in this item.

Table 4. The number of students who know the meaning of the inverted class

<i>Specialization</i>	<i>Mathematics</i>	<i>Informatics</i>	<i>Chemistry</i>	<i>Physics</i>
The no. of students who know the specificity of the flipped classroom	16	22	9	14

Most answers fall into the following patterns: I accidentally read about this topic (36 students - 59.01%), I talked to a teacher about this topic (11 students – 18.03%), I know from a college friend (5 students – 8.19%).

Item 3 aims to participate in the flipped classroom activities. Thus, out of 61 students who stated that they are aware of the specificity of the flipped classroom, only 13 say they have participated in activities carried out from this perspective.

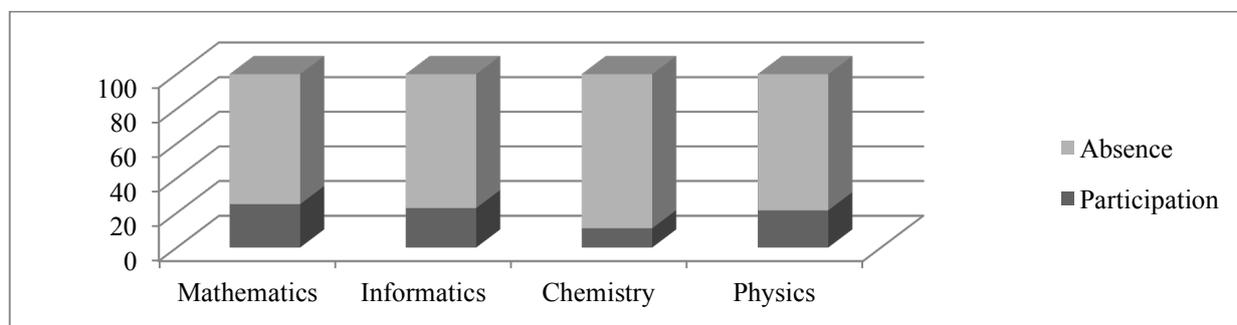


Figure 2. The percentage of participation in activities specific to the flipped classroom

Item 4 addresses the main benefits of training in the context of the flipped classroom. The most frequent answers refer to:

- The modernization of didactic act (9 students – 69.24%);
- The personalization of training (2 students – 15.38%);
- Other answers (2 students – 15.38%).

Item 5 aims to identify the disadvantages or limitations of training in the context of the flipped classroom, and the answers of the students are distributed as follows:

- The lack of necessary facilities and infrastructure (7 students – 5.84%);
- The absence of the teacher's support (3 students – 23.08%);
- Other answers (3 students – 23.08%).

As for the introduction of the flipped classroom in the training of the future students (Item 6), we find the following:

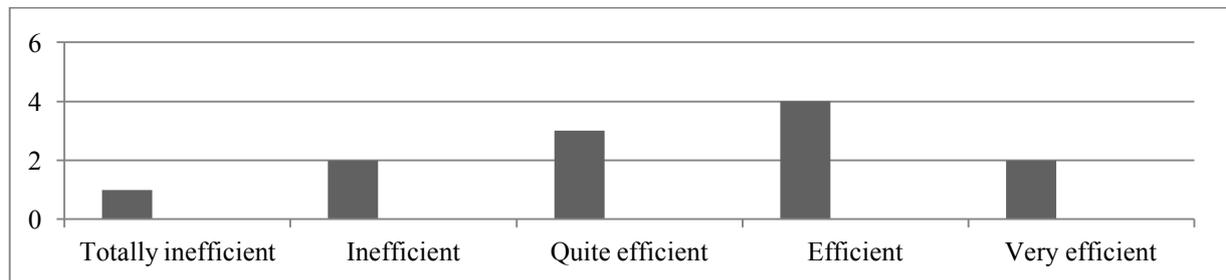


Figure 3. The degree of efficiency found by the students in relation to the flipped classroom

Starting from these results, we interpreted the obtained answers and formulated some partial and general conclusions that will form the basis of the decisions taken at DPPD level, regarding the projection and implementation of some didactic activities related to the initial training of the future teachers.

5. Discussions

The answers to the first item indicate the lack of knowledge or the insufficient knowledge of the students in relation to the specificity of the flipped classroom. The fact that over 50% of the interviewed students do not know the specifics of the flipped classroom, some of whom have never heard about this mixed form of training, suggest anchoring in the traditional practices, which, beyond the positive aspects they have perpetuated, are no longer capable of generating adequate responses to the labor market demands and the current lifestyles.

In Item 2, the students responded that they heard about the flipped classroom by accidentally reading about the subject or talking to a teacher or a colleague. The current generation of young people frequently access the internet, learning a lot about this alternative. This explains the high percentage (over 50%) of those who chose the Internet as a source of information on the topic in question. Without a teacher's guidance, few of them are specifically looking for this new form of instruction.

It is possible to discuss this topic in the computer science classes in pre-university education, but it is more important to implement the principles of the flipped classroom in training. In the Romanian school practice, there are more and more hybrid courses (as some "educational islands" for the capitalization of technology), but there is a need for better material supply and greater creativity on the part of the teachers.

The small percentage of students who stated that they had previously participated in training programs (13 students from 61 students who know the specifics of the flipped classroom – 21.31%) express the cantoning of the Romanian pre-university education system in classical techniques and already tested training courses. Referring to the number of students who have information about the characteristics of the flipped classroom (61 students), we mention that the number of those who participated in activities specific to the flipped classroom is quite small (4 out of 16 students from the Department of Mathematics – 25.00%; 5 out of 22 students from the Department of Informatics - 22.73%, 1 out of 9 students from the Department of Chemistry – 11.11%, 3 out of 14 students from the Department of Physics – 21.43%).

The advantages of training by reference to the flipped classroom are the content of Item 4. Among the most frequent answers are the modernization of the didactic act. Both the students and some teachers want a different approach to the instructional-educational process. The implementation of the new educational technologies brings a new breath, it capitalizes the students' technological abilities and rethinks the teacher-student relationship.

The disadvantages of training by reference to the flipped classroom are the content of Item 5. More than 50% of the students who answered the question on boundaries stress to the shortage of modern educational means. Equipping each class or laboratory with computers, video projectors, tablets, or other gadgets becomes a necessity. That is why we believe that this should be the priority of the current education reform. Of course, the modernization of the teaching technology is achieved after all schools – from both urban and rural areas – meet the basic material conditions (modern heating systems, lighting, sanitary facilities, transport means, etc.).

We were interested in learning whether the students think it important to implement the flipped classroom in their initial training as future teachers. By interpreting the students' answers to Item 6, we find that only 38.45% of the interviewed students (who participated in the research and who claimed to be familiar with the specificity of the flipped classroom) consider effective and very effective the introduction of the flipped classroom in the instructive-educational approach. This may be based on the previous limited experience of the students in this practice, but there are a number of other issues that we need to keep in mind.

Considering the weaknesses and threats specified in the SWOT Analysis, we find that:

- There is a need for adequate funding and equipping of classrooms;
- A proactive attitude of the teaching staff is required in relation to the new information and communication technologies used in the educational process;
- An authentic collaboration between faculties and departments within the University, between the University and the external partners with expertise in providing information and technology, between teachers and students;
- It is desirable to implement active and constructive strategies, based on change.

It is unrealistic to expect the existence of computers in schools to lead to transformative learning experiences without giving the teachers and students the support needed to implement the new strategies.

If we go from the positive points and the existing opportunities regarding the implementation of the flipped classroom in the training of the future teachers, we note the following:

- The possibility to develop high quality online or multimedia resources;
- The opening of the educational actors to the modernization of the didactic act;
- Interest in collaborating on this topic with students and professors from other Universities (both in the country and abroad);
- Access to projects that provide funding and allow the exchange of experience and good practice.

6. Conclusions

The flipped model has also been called the "mixed approach," "hybrid learning," or "inverted model." The flipped model was designed to blend and make full use of the available electronic technologies, which are then combined with face-to-face learning events. By flipping the traditional learning environment by providing training content, often online, outside the classroom, the flipped classroom is one of the new aspects that contribute to changing the paradigm and can reform educational practice. By using the video technology, the students "digest" content at their own pace and use their time in the classroom to discuss and solve difficult problems.

Delivering content can take different forms, but bringing the student to the spotlight and using the computer are the two basic elements. The students can watch the video presentations proposed by the teacher at any time of the day. Reading through videos adds, as an alternative, the inclusion of podcasts, e-instructions, e-demonstrations, site-specific explorations, or electronic versions. A course that uses the flipped classroom fully and correctly must be carefully designed, orchestrated, implemented, and evaluated.

The flipped learning method creates an environment in which students use their innovative skills, reflect on the knowledge they are presented and are encouraged to ask questions. However, there are benefits and limitations to be considered as a didactic format as in any didactic format. Our study has highlighted some positive aspects, but it is necessary to broaden the research sample and to carefully analyze the existing vulnerabilities.

Much of the attractiveness and strength of the model refers to the availability of all types of video and audio capture formats. Important are the new technologies, programs, and information sites that are designed to help implement the flipped classroom concept. Included in the constructivist instructional paradigm, the flipped classroom is a model that has potential and is currently used by the teachers who embrace the principles of constructivist training.

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