Flip IT!

Flipped Classroom
in the European Vocational Education

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ERASMUS+ Strategic Partnership

2015-2018

State-of-art Country Report

Czech Republic

University of Hradec Králové

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1 Country education and vocational training system

1.1 Background of the Educational system (legal education) in the country

The body responsible for the national education system in the Czech Republic is the Ministry of Education, Youth and Sports (MŠMT). The schools from the pre-primary level until the post-secondary level are governed by the regions within the national education system. Secondary VET schools are supported by national and regional authorities and by the European structural funds to develop their capabilities also for adult education. All (including VET) schools enjoy a relatively high level of autonomy. School directors hold significant powers. They are responsible for preparation and implementation of school curricula based on approved national curricula, for the quality of pedagogical work and human resources policy, for educational management and efficient use of financial resources. School councils are established at schools as a consultative body. The councils include representatives of the school founding body, pedagogical staff, parents and sometimes pupils.

Vocational education and training up to the level of tertiary professional schools is governed by the Act on pre-school, basic, secondary, tertiary technical and other education. All (including VET) schools enjoy a relatively high level of autonomy. School directors hold significant powers. They are responsible for preparation and implementation of school curricula based on approved national curricula, for the quality of pedagogical work and human resources policy, for educational management and efficient use of financial resources. School councils are established at schools as a consultative body.

Compulsory education in the Czech Republic lasts nine years. Usually pupils complete it in general schools (either in a basic school for 6-15 year olds or in more prestigious gymnázia programmes from the age of 12-14). At the age of 15, the pupils finishing the basic school choose between general education IVET. At upper and post-secondary levels IVET is provided by secondary vocational schools (střední odborná učiliště – SOU) and secondary technical schools (střední odborné školy – SOŠ); at tertiary level – by tertiary professional schools (VOŠ – vyšší odborné školy) and higher education institutions (VŠ – vysoké školy). There is no apprenticeship system (or ‘dual system’) in the country. IVET is mostly school-based. However mandatory practical work-based training and work placement are integrated into IVET curricula.

The majority of VET schools are public schools established by regions. The rest includes private schools, church schools and schools run directly by ministries (state schools). Lower secondary IVET programmes (ISCED 2C) are a marginal part of the IVET system. They are

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designed primarily for students with mental disabilities of various severity or other disadvantaged students who attended nine years of compulsory school and have had learning difficulties. The programmes last one to two years and are designed to prepare students to do simple tasks as part of manual occupations in services or manufacturing and/or to strengthen their manual skills and working habits. The programmes are provided by (upper) secondary vocational schools (střední odborná učiliště – SOU) or by practical schools (praktické školy) that apply a special pedagogy. At the end of the programme students take final examinations and obtain a certificate of a final examination or in some programmes only obtain a certificate of the completion of a programme.
study in any kind of tertiary programme (upon passing an eventual entry examination set by the institution).

Horizontal permeability between schools is possible upon the decision of the school director and usually depends on a kinship of both schools. Moreover, since 2009, it has The upper secondary vocational education is provided by secondary vocational schools (SOU) and secondary technical schools (SOŠ). Upper secondary education is generally open to all applicants who, in addition to completed compulsory education meet the criteria usually set by the school director. The basic school performance is a principal criterion and in most cases an entry examination must be passed.

Applicants can choose from 281 VET programmes that prepare for one or more professions. Schools can further develop the programme specialisation according to local labour market needs or other criteria. The programmes are specialised but include general subjects in all grades (in upper grades the share of specialised subjects increases). Most IVET programmes at upper secondary level are three (ISCED 3C) or four (ISCED 3A) years.

Three-year vocational programmes (ISCED 3C) enable graduates to perform manual work in crafts, services and similar occupations. They are usually provided by secondary vocational schools (střední odborné učiliště – SOU) and include a final examination and a vocational certificate. Graduates enter the labour market or may enrol in a two-year follow-up programme (ISCED 4A) to pass the maturita examination and continue to higher education. Three-year vocational programmes include general subjects, vocational subjects and practical training. The minimum allocation of general and vocational subjects and practical training is defined by the National Curricula (see Section 3.2.2) and varies depending on the programme and the grade. Usually general subjects are allocated 30-35% of the instruction time; vocational subjects – 20-30% of the time and practical training 35-45%. Practical training takes place at specially designed school training facilities or workshops/ laboratories; only exceptionally it takes place in a real work environment. According to the law, the final examination and the issuing of vocational certificate must be supervised/checked/reviewed by an expert (member of the examination board) from an enterprise.

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Four-year technical programmes (ISCED 3A) entitle their graduates to apply for higher education or to perform mid-level technical, business and other similar jobs. They are usually provided by secondary technical schools (střední odborná škola – SOŠ) and are concluded by the maturita examination. The successful graduate gets a maturita certificate which is a prerequisite for higher education studies and acknowledges the technical qualification for the labour market. Studies include general subjects and vocational subjects, depending on the programme. Vocational subjects include practical exercises, laboratory work, etc. Work experience in companies and other institutions is on average six to eightweeks. The share of general and vocational subjects varies depending on the fields of study and grades. It is approximately 45:55 in favour of vocational subjects.

Secondary vocational schools (střední odborná učiliště – SOU) may also provide four-year vocational programmes completed by maturita examination, but this is not a common practice. They provide a qualification to perform demanding manual work and technical occupations and open up the path to higher education. The permeability of the Czech education system is traditionally very high. Vertical permeability is fostered especially by the availability of programmes where a VET graduate can obtain maturita certificate that allows to been made possible for graduates of secondary vocational programmes to get another secondary vocational qualification through the so-called 'shortened study programmes' provided by the secondary schools at the same conditions as regular courses, but lasting only one to two years.

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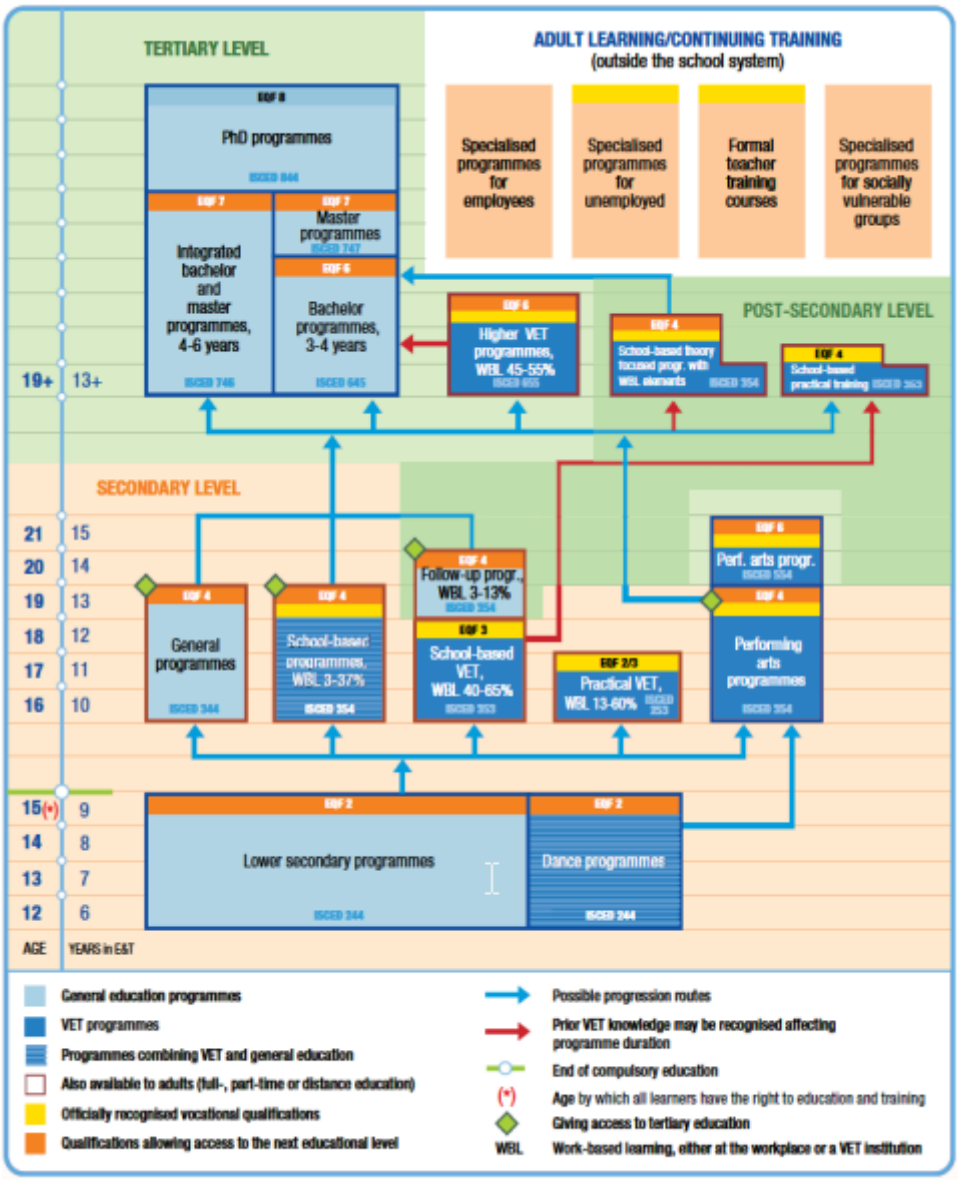
1.2 Diagram of the country education and vocational training system.



NB: ISCED-P 2011.
Source: Cedefop and ReferNet Czech Republic

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2 General framework of Technology and Educational Innovation in the country

2.1 State programs, initiatives

The basic document related to ICT in education in the Czech Republic is "Strategy of Digital Education until 2020", which was approved by the Government in October 2014. Furthermore, the conception called "The Digital Czech Republic v. 2.0, A Way to Digital Economics" was approved by the Czech government in March 2013. The conception literally requires the full involvement of modern technologies in the whole educational process at primary schools. There is a parallel strategy for increasing digital literacy and electronic skills of Czech citizens. The document Digital education - Touch your future is a kind of reaction to the present necessity of changes in the system of education. People educated in the "classical way" cannot find their full position in the present digital world.

The Czech Republic can apply the EU strategic objectives and priorities, and can use European funds for supporting the realization of some changes. In September 2013 the European Commission launched the educational initiative "Opening up Education", which presents the actions that the Commission will implement, including policy orientation for operations funded under Erasmus+ and Horizon 2020. "Opening up Education" supports innovative ways of teaching and learning through new technologies and digital contents. Such measures are to be taken which will result in more open educational environments, in a better and more effective educational process and in reaching the objectives of the "Europe 2020" strategy. A set of the key transformational measures are proposed:

- to help educational institutions, teachers and pupils to acquire digital skills and learning strategies,
- to support development and accessibility of open educational resources,
- to interconnect classes and to implement digital devices and contents,
- to mobilize all the parties involved (teachers, students, families, and economic and social partners) and to encourage them to change the role of digital technologies in educational institutions.

At the level of the European Union these measures will be realized through the already mentioned new programs Erasmus+ a Horizont 2020.

The Digital Education Strategy develops the Strategy of the Educational Policy of the Czech Republic until 2020 and it proposes a set of potential interventions supporting the digital education in the initial education. These interventions seem to be more and more

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demanded. The objective of the Strategy is to set such conditions and educational processes which will make the digital education realizable.

2.2 Technology-related teacher training programs

Teachers´ training is specified and the specifications are declared in the document called "State Information Policy in Education 2001 - 2006. The main objective of this conception was to increase teachers´ level of user skills. In September 2008 the Ministry of Education worked out the document called "Proposal of the Conception of the Development of Information and Communication Skills in Education in the Period of 2009 - 13", the aim of which was to train teachers in using the digital technology in school classes, in developing digital teaching materials and in making them accessible. Although the prepared conception was not legally declared and fully realized, some of the proposed objectives were reached.

Developing of skills in the sphere of digital technologies is focused also in the follow-up education and training of teachers. According to surveys carried out by the ČŠI (the Czech School Inspection), a majority of teachers declare themselves as being quite advanced in the sphere of digital technologies. A lot of digital teaching materials have been created by teachers themselves, quite a big number of teachers have experience with using various technologies and online service in classes. However, these declared skills and knowledge are not fully used in the real teaching process. The use of digital technologies is usually limited to the presentation of the topics taught and / or as an illustrative support. That means that digital technologies are typically used for just supporting traditional ways of teaching and presentation of the required contents, and pupils keep being passive. It seems that quite big investments into training of teachers are (at least partly) wasted because the required skills are not properly applied in practice. This situation has probably resulted from the fact that an effective use of digital technologies is supported neither by curricular documents nor by the career system. Interconnection of varied learning environments (school, classroom, home, virtual online environment, varied forms of informal learning) is still not used in the educational process. And it is specifically the out-of-school environment in which digital technologies are frequently used in ways which could be inspirative for formal educational process at schools.

The National Institute for Further Education is an institution which focuses on teachers´ training in the spheres which have to be sorted out at the national level. That is why this institution runs courses in improving teachers´ knowledge in the ICT field. There are other institutions in the Czech Republic which organize courses in working with computers, internet and interactive boards. These courses focus mainly on users´ abilities. Teachers are

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made familiar with the potential of new technologies and possible ways of working with these technologies. However, these courses ignore the methodology of using ICT in the real training process.

Courses focusing on using ICT in teaching of specialized subjects at secondary vocational schools are completely missing.

2.3 Research groups and networks related to education and technology

Research groups focusing on implementing technology into education have been formed dominantly at Faculties (Colleges) of Education. Jiří Zounek and his team of other teachers from the Faculty of Education of Masaryk University in Brno have been investigating (as a long-term assignment) the implementation of ICT into education. Another research group works at the Department of Information Technologies and Technological Education at the Faculty of Education of Charles University in Prague. Ondřej Neumajer does research in modern tendencies (cloud computing, BYOT / BYOD - Bring your own technology / device), Bořivoj Brdička and his work will be mentioned later. The issues of using ICT in education and those of various possibilities of using and implementing of various forms of e-learning are researched by the academic staff of the University of Hradec Králové (P. Poulová, Martina Maněnová, Václav Maněna, Petra Poulová, Ivana Šimonová, Věra Tauchmanová) in a close cooperation with the academic staff of the Faculty of Education of the University of Ostrava (Kateřina Kostolányová and others). Methodological materials are created on the basis of the above mentioned research, these materials are addressed to and used by teachers at all levels of schools in the Czech Republic (e.g. Moderně s Moodlem https://knihy.nic.cz/files/nic/edice/Moderne_s_Moodlem_web.pdf)

2.4 Educational innovation projects and technology

Within the European Social Funds (ESF) there were two calls realized, which has resulted in a significantly strengthened position of ICT in education. The calls concerned were Call No. 51 of the Education for Competitiveness Operational Programme (ECOP), Priority Axis No. 1: Initial Education, Areas of support: 1.3 Further Education for the employees of schools and school facilities, and Call No. 56 of the Education for Competitiveness Operational Programme (ECOP), Priority Axis No. 1: Initial Education, Areas of support: 1.1 Increasing quality in education.

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The main objective linked with the realization of Call No. 51 is improvement of competences of primary and secondary school teachers in the field of integration of information and communication technologies (ICT) into teaching. Thanks to the projects granted by the EU, primary and secondary schools were extraordinarily financially supported in the process of installing new information technologies to schools and in the process of further education of school employees. However, this support still has not resulted in an effective use of the available devices and in the sufficient integration of ICT realized by teachers.

Another important impulse towards educational innovations was the publication "ICT in schools - Reality, Perspectives, Recommendations" by J. Zounek (in: Řízení školy č. 1/2014, pp.. 23 – 25). Referring to international research, the author summarises: "Teachers use ICT primarily for preparing of their classes. However, ICT are significantly less used during the classes. Teachers from one school are recommended and encouraged to exchange their experience, learn from one another and teach one another. This kind of support is better and more effective than being training by external experts."

3 Literature review on Flipped classroom

Flipped classroom approach and methodology are at a very beginning stage of their development in the Czech Republic, so it is very difficult to make a kind of a systematic overview of the literature created on this issue.

No publications can be found in the sphere of VET so far. The texts available nowadays focus mainly on general presentations of the method itself; foreign sources are translated into Czech and commented on. One of the authors who devote their attention to Flipped Classroom and present this issue to Czech specialists in education and to general public is Bořivoj Brdička. His texts are usually available online, e.g. *Does Flipped Classroom make sense?*, which was published in 2013 and summarizes general advantages, and challenges of the Flipped Classroom approach.
Another author coming up with the topic of Flipped Classroom is Zuzana Kadlecová, who presented the text *Khan Academy and "flipped classroom"* in 2012. She devoted her attention to the personality of Dr. Lodge, and she finds important linking moments between the methodology of Flipped Classroom and Bloom´s taxonomy.

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Both the above mentioned authors publish their texts, views and recommendations on the innovative methodological approaches on the portal called „spomocnik.rvp.cz", which is a methodological website presenting inspirations and experience of teachers.

A very positive point is that the topic of Flipped Classroom starts to be presented by some authors at prestigious conferences. In 2015, for example, three authors (Katerina Kostolanyova, Libor Klubal and Jan Netolicka) made a presentation called "*Using Mobile Technologies for Flipped Classroom Teaching"* at the international conference Efficiency and Responsibility in Education (ERIE) 2015**.** The paper dealt with the possibilities of using a tablet to prepare video lessons, and it was based on the summary of experience gained from teacher training sessions. The fact that teaching based on flipped classroom principles requires specific teacher´s skills was emphasized. The presentation also included an analysis of the most common fears of teachers who think about applying the flipped classroom method. The authors´ objective was to prove that using of proper tools can minimize these fears, and to describe and present ways and possibilities of using iMovie tool for creating video lessons The data collected through unstructured interviews were presented in the text.

Other experience linked with the model of flipped classroom realized as a kind of experiment at a primary school (mathematics teaching) were presented at three conferences in 2014 by Martina Maněnová and Radim Špilka. These presentations describe the experiment from several points of view. First as a classical pedagogical experiment focusing on students´ performances (i.e. control and experiment group, a pre-test, a mid-test and the final test post-test). Furthermore, the research focused on pedagogical communication and interaction in the experimental and control class. The FIAS method (Flanders, 1970) was applied when these two issues were observed, sixteen categories were focused on (Maněnová, 2012). Another quantitative research method used was the analysis of the frequency of learners´ access to the teaching videos. The research was completed with the application of qualitative methods - interviews with pupils were realized and the pupils wrote essays based on their experience with the flipped classroom model. The conclusions of the research were quite positive to the Flipped Classroom method. The pupils from the experimental group got more active, their school performances were statistically significantly and the teaching videos were evaluated as beneficial.

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4 Case studies in your country/in your institute/school

4.1 Case study 1: Flipped Classroom model in math teaching on upper primary school

Educational level
Upper-primary school,

Knowledge area Math

Learning option
Blended learning

Methodology
The project was focused on the application of flipped teaching method, when students learned some chapters of mathematics through an animated video.

The aim of the research project was to implement training through using of the flipped classroom model and to find out whether the animated video used can help to increase students' academic performance.

The research involved 54 pupils, 27 of them in a control group and in an experimental one. The average age of students was 13.5 years.

A long term classical pedagogical experiment was used to verify the functionality of the created animated video. The control group of pupils (one class) progressed through traditional teaching methods - a presentation of a new topic took place during school lessons. The experimental group (one class of the same school year) had an animated video at their disposal (it was specially created for the purpose of the experiment). Websites (prevracenatrida.cz) were created for the distribution of the educational videos. Pupils were explained to what the flipped classroom teaching model is. They studied the animated videos during their home preparation. Each student was assigned a login name and password. Students had also opportunity to comment on each video and discuss problematic parts of the matter on the social network. Brief summaries of the topics and explanations of the problematic parts were given in classes. The emphasis was placed on independent work and on enlarging and deepening of the knowledge. At the beginning of the experiment both the control and the experimental group went through a didactic test (pre-test). In the middle of the experiment students took an mid-test. At the end of the experiment both the groups took then another didactical test (post-test). The researcher (who was also a math teacher

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for the experimental group) created twenty-five educational videos that cover the mathematics curriculum for the first half of the eighth grade . At the end of the pedagogical experiment students of the experimental group filled out a simple questionnaire, which consisted of three closed questions. The questionnaire was chosen as a fast feedback given by pupils to the new method. The pedagogical experiment was conducted from September 2013 to January 2014. The statistical software NCSS and Excel were used for the data processing. The basic values of descriptive statistics were calculated for testing hypotheses, then Student t-test and the Mann-Whitney nonparametric test were applied, whereas the normality tests did not confirm the unequivocally normal distribution of the collected data. The hypotheses were tested at a significance level $\alpha = 0,05$.

Educational activities

Pre-lesson video watching, active learning methods during lessons

Tools, software

Inkscape vector editor, Camtasia studio, Audacity, website prevracenatrida.cz, Youtube channel

Assessment

- Pretest and 2 knowledge tests
- Essays
- Discussion

Results

After evaluating of the pedagogical experiment it can be stated, that there was a significant difference in achievements (evaluated based on post-test) between students of the experimental and the control groups in the selected thematic unit of mathematics. The animated video used in the flipped classroom model (when students are studying a new educational material through online media) had a significant impact on the academic performances of the pupils. The created animated videos were evaluated very positively (based on the answers to the questions included in the questionnaire).

Reference

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4.2 Case study 2: Flipped Classroom in an Mixed-Age Class at Lower Primary School

Educational level
Lower primary school

Knowledge area
Math

Learning option
Blended learning

Methodology
Mixed-age primary school is a school where more classes of different age are taught in one classroom. During a school lesson, the teacher has to devote his care equally to all the taught age groups. In the presented case, the first, second and third classes were taught together, the total number of them was 18 (5 first-year pupils, 9 second-year pupils and 9 third-year pupils). And it was the flipped classroom model which made the pupils more involved in the learning process during the whole lessons. Teaching videa are used only in mathematics at that school so far, but the teacher uses the technology (touch board, data projectors, tablets). The teacher mentioned above is the author of the textbook of mathematics, he has created teaching videos. These from 2- to 3-minute long videos are directly related to the individual parts of the textbook, they add hand-made drawings and comments to the texts in the textbook. The videos are used not only for doing homework and for preparing for lessons, but they are also used directly in the teaching and learning process at school.

Educational activities
Pre-lesson video watching, watching the video during school lessons when the teacher works with another age group (another class).

Tools, software
Mathematics textbook, tablets with headphones, multimedia interactive textbook http://www.matyskova-matematika.cz/nns-cz/.

Assessment
- Konwledge tests
- Observation

Results

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Teaching in schools with mixed-age classes is more complicated because the teacher has to make busy not only the pupils taught by him / her at the given moment but also the pupils belonging to the other age groups present in the classroom. From this point of view, the model of the flipped classroom is very effective. Teaching videos are used not only for doing homework but they also make the teaching process easier for the teacher because the pupils use videos while revising and / or learning new topics during school lessons.

Reference http://www.matyskova-matematika.cz/

4.3 Case study 3: Flipped Classroom in project The Integration of Mobile Technologies in Teaching (according to Kostolányová and collective)

Educational level
Primary and secondary schools

Knowledge area
All sujects in primary and secondary schools

Learning option
Blended learning

Methodology
The project has been in progress since October 2014 and it is planned to finish in June 2015. 586 teachers from 39 primary and 3 secondary schools participated on the above mentioned project. All schools are located in the Moravian Silesian Region. The sample included teachers of random subjects. Every teacher was equipped with an iPad tablet and underwent a series of training sessions aimed at their utilization in classroom. During the first stage, general operating skills were taught.

During the following stages of the training, teachers could choose sessions according to their interest or qualification. Individual courses were introduced with a brief description. Principles of work in a flipped classroom environment could be studied in one of the courses. 68 teachers, that is 11.5% teachers chose this course. Teachers who chose the flipped classroom course were informally interviewed, the goal being to identify the greatest obstacles they saw with implementing the flipped classroom in teaching. The interviews did not have any defined structure nor did the teachers have to fill in any form. The interview rather had the form of a discussion before and after each training session. Thanks to the fact that there were groups of approximately 10 teachers, it was rather easy to record their opinions and analyse the most common ones.

Educational activities
Test, cooperative activities

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Tools, software

- Cloud Services – aimed at the possibilities of file sharing and web applications for file management;
- Students in a Computer Lab – introduction of multiplatform applications for cooperative work, e.g. Socrative, Paddlet;
- Electronic Texts – ways of work with different kinds of e-texts and their specifics – PDF, ePub, iBooks;
- Creating Teaching Materials with Regards to Copyrights legislative – using online sources while not violating the copyrights, Creative Commons licence;
- Presenting with an iPad – using an iPad to present information, project, and work in a more interactive way;
- iPad in a Classroom – possibilities of using an iPad in everyday lessons.

Assessment

Discussions with teachers, common assessment of pupils (test, self-tests, homeworks, discissions)

Results

All teachers claimed that they had never been able to implement such method in their teaching due to the lack of their technical skills. Many of them had negative experience using the standard camera-PC editing software model. Large number of teachers was unwilling to present their work publicly, however it was not possible to clearly identify their reasons. Small minority of teachers showed no interest in sharing their work. Some teachers were afraid of possible negative criticism. Only about 10% of teachers knew about the possibility to share videos on YouTube without making them public. iPad as an Experimental Tool for Teaching Science was the name of another course offered. The course annotation also included using iPad as a tool to work with video recordings and creating videos using iPad formed a major part of the course. At the end of the course, teachers were introduced to a couple of basic examples of the flipped classroom method. Consequently, they were asked whether they could imagine such a lesson in reality, and what problems they would expect. They expressed the following fears:

- unwillingness to change the verified teaching model;
- necessity to change their approach and subsequently create new teaching materials;
- preparing lessons would be time consuming.

The above stated findings show that after being trained to work with iPads, teachers lost their fears from technical difficulties, especially compared to the traditional camera-PC model. However, the fears from the change of traditional teaching models remained. Teachers who took the Flipped Classroom course, which included work with video, appreciated mainly how easy it was to create and edit video using iPads, and also the possibility to share and publish the video immediately. These teachers had been thinking about changes to their way of teaching, which they demonstrated by picking this specific course. After completing the course, the absolute majority of them claimed they were surprised by the simplicity of using iMovie app and that they would try to use it in their future work.

Erasmus+

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