



Teaching Critical Thinking with Flipped Classroom

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Abstract

The emergence of ICT tools in education gives new opportunities for using Flipped Classroom (FC) methods in education. Although the use of FC methods presents numerous benefits, its widespread use is hindered by factors like the necessary increased efforts for preparing FC activities or lack of recognition and/or support in using this method. FC methods are prone to be used for developing transversal competences like self-regulated learning [1], communication skills [2] and critical thinking skills [3]. Critical thinking is listed among the information competency standards and is often cited as one of the most meaningful learning outcomes in many information literacy plans and activities. In the "Critical thinking in the information society (CTIS)" project educational materials were elaborated for teaching an introductory course in Critical Thinking and Media Literacy. Videos and tests for teaching 20 subjects in these topics were developed in collaboration of five universities from Romania, Greece, Poland, Lithuania and Bulgaria. The developed materials were tested in classroom settings. In this paper we present the results of student satisfaction and teacher experiences when applying the developed materials at Sapientia University (Romania). As compared to the control group, preliminary results indicate higher level of student engagement and increased student satisfaction when learning with flipped methods.

Keywords: *critical thinking, flipped learning, media literacy*

1. The Flipped Classroom Methods and Its Challenges

The increased availability of the Internet and Information and Communication Technology (ICT) resulted in an ongoing paradigmatic change in education. Before the informational era educational methods focused on providing availability to information. One-way information transmitting methods (like frontal teaching or reading books) dominated teaching, as opposed to collaborative, problem-solving based methods.

With the appearance of the ICT, access of information is facilitated, and asynchronous communication tools can be used for different types of educational communication (e.g. educational blogs, computer-supported cooperative learning) in schools and outside of school settings. New pedagogical methods (like blended learning) were developed, and distant education is gaining space. Learning is becoming more self-paced, self-driven, and the necessity and possibility of lifelong learning is becoming part of everyday life. Educational focus is changing from the provision of information to facilitating the development of higher order thinking skills (like critical thinking and problem solving). Developing digital literacy, and, in general, synchronizing the educational offer with workplace and real-life requirements is a concern of educational policymakers. The educational policy of the European Union, and the national directives of the member are also supporting this transformation.

However, transforming educational norms and practices is a difficult and lengthy process. Changes have to be well-prepared; a transformation does not necessarily lead to improvement [4]. Developing educational practices and materials in accordance with the aforementioned requirements is a work-intensive process.

One of the educational approaches which received increased attention with the spread of internet is the flipped classroom method. The idea behind a flipped classroom (FC) design is that learners can receive an introductory material for the next class in a form of video or presentation, less often reading material before in-class educational activities. Students process and interpret the material at home so that in-class activities can focus on clarification of the questions, or practicing exercises related to the new knowledge. This avoids the need for the teacher to engage in long explanations usually associated with passive student attention. There is more time for a more personal, interactive learning, using methods like panel discussions, case-based presentations, expert led discussions, team-based discussions, role -plays and student presentations, discussions and debates. This model puts more responsibility for learning on students so students can work towards mastery of the material. Although



the method can be used using solely traditional, off-line tools (like books and drill-books) the internet and development of ICT facilitated moving the lecture outside of class with slides, audio, podcasts, or narrated presentations.

The flipped learning approach has the potential to fully equip students, and those already in the work force, with skills to address 21st century discipline-related problems. Research results indicate that when changing traditional methods to flipped classroom it is expected to improve student's performance [5] and satisfaction [6] [7] [8, 9]. Flipped classroom methods increase student's motivation and their self-confidence [10], their commitment to learn [11] [12] [13].

Reviewing 28 studies on flipped classroom O'Flaherty & Phillips [14] conclude that teachers does not really understand the role of Flipped Classroom steps or the relation between classroom and home activities. Students will be more motivated in doing the homework tasks if they receive feedback and they see the connection with classroom activities. Betihavas, Bridgman, Kornhaber, & Cross [15] conclude in their review that students will be more motivated if they are explained the advantages and method of Flipped Classroom.

In spite of the aforementioned benefits of the FC method, researchers and practitioners indicate that among impediments of widespread usage of FC methods are the additional time and technological support in relation to development of flipped learning activities [14]. The flipped approach often involves the investment of significant time and energy on the part of instructors (e.g., recording video lectures; designing additional in-class activities) [15, 16]. For example, producing a 10-minute instructional video can take 32 working hours, if animated. It is therefore recommended for teachers flipping their courses in team. By working in team, teachers can share their experiences of implementing flipped classrooms as well as their teaching resources [2, 17] [18].

As a result, there is a dissonance between flipped learning research and practice: although there are isolated initiatives to convert several topics of teaching to flipped methods, coherent materials covering and entire discipline are rarely developed, mainly because the flipped approach often involves the investment of significant time and energy on the part of instructors (e.g., recording video lectures; designing additional in-class activities).

2. Critical Thinking in The Information Society – A Project for Elaborating Flipped Classroom Materials

In order to overcome the difficulties of covering a teaching subject with educational material necessary for flipped classroom activities, researchers from five Higher Education Institutes (Sapientia University – Romania, Aristotle University – Greece, Pedagogical University of Cracow - Poland, Burgas Free University – Bulgaria and Vilnius University – Lithuania) has formed a partnership with the goal of developing all the necessary flipped learning pedagogical material (out-of-class tasks, pre-assessment tools, in-class activities) covering a higher education discipline of Teaching Critical Thinking and Media Literacy.

The subject area of Critical Thinking and Media Literacy were targeted for several reasons. First, the importance of media literacy – which include all the technical, cognitive, social, civic and creative capacities that allow us to access and have a critical understanding of and interact with both traditional and new forms of media – is gaining increased attention in the information society [19, 20]. Media literacy involves much more than simply absorbing information. To think critically about the messages we receive, we must consider various perspectives and understand how cultural viewpoints differ. Competencies like valuing diversity, respecting others, and relating across backgrounds are just as essential. A truly media literate person realizes not only that every message has bias, but also that every way of expressing ideas has cultural roots. If we listen with empathy rather than judgment, we gain insight into lives unlike our own while retaining our right to an independent perspective. Diverse opinions, when shared respectfully, expand our thinking far beyond any single influence.

Critical thinking (CT) is described as a competence for the future, a key competence in a global information society, enabling efficient and proactive action in a changing reality in which individuals must cope with information chaos. Teaching critical thinking and media literacy empowers individuals to be discerning, informed, and active participants in our interconnected world. In addition, the competence of critical thinking is exceptionally important in the context of self-development, and especially – the development of teachers, because this professional group has to cope in its work with unpredictability, ambiguity, the need to constantly verify information, update existing competencies and acquire new ones. Critical thinking also makes it possible to discover weaknesses/deficiencies in one's own thinking, shortcomings in one's skills, and make judgments based on evidence/arguments.



Improving critical thinking involves equipping individuals with the ability to analyze information objectively, evaluate evidence, and make informed decisions and fostering problem-solving skills. Critical thinkers are less susceptible to misinformation and manipulation and will contribute to a healthier democracy and civil society, by becoming informed citizens. Similarly, Media literacy teaches people how to assess the credibility of sources, spot biases, and recognize misinformation. In summary, teaching critical thinking and media literacy empowers individuals to be discerning, informed, and active participants in our interconnected world.

Research evidence suggest that critical thinking can be improved in educational settings [21]. CT skills can be taught in a specific course that focuses on CT theories, skills, and practices [22]. Reviewers also recommend focusing on the development of critical thinking for effective flipped classroom practices [14].

Acquiring critical thinking skills is a prerequisite for developing media literacy [23, 24]. Teaching critical thinking skills as well as improving media literacy is a core part of modern educational policies. EU funds and programs, including Erasmus+, Horizon 2020, and Creative Europe, promote media literacy and critical thinking in education. The Teach Europe Project Aims to strengthen European citizenship education by upskilling teachers and encouraging students to think critically about their European identity and active citizenship.

The consortium of the CTIS (Critical Thinking and Media Literacy) project is working to cover 20 subjects in the domain of critical thinking and media literacy with 10-15 min. pre-class educational videos (narrated in English), pre-class tests with 8 closed questions (to be completed after watching the videos), post-class tests with 4 open-ended questions and a guide for teachers describing a proposed procedure of applying the materials in classroom settings including description for several interactive activities for each subject. All the materials will be available in seven languages (English, Hungarian, Greek, Romanian, Polish, Bulgarian and Lithuanian), and can be downloaded from the project's site (ctis-erasmus.info). The project is funded by the Erasmus+ Strategic Partnership Program.

3. Methodology

Each project partner has pilot-implemented at least 8 of the developed materials (educational videos and pre-test) during a one-semester academic course (in the 2023/2024 academic year). Students were asked to watch the educational videos before course (usually at home) and complete the eight-question pre-test related to the video – as recommended by FC reviewers [25]. Videos covered all the information necessary to answer the test questions correctly. Teachers analyzed the answers to the questions before class and tailored the class activities in accordance with the answers, namely if some questions were more difficult, the specific topic received more emphasis during class activities.

Teachers completed an evaluation questionnaire after each class describing the interactive methods used in the classroom, their general impressions and reactions of students experienced during classroom activities. In the last class teachers organized a group-discussion with students where they could relate their experiences, and they also filled an online questionnaire evaluating their impressions regarding the flipped classroom activities.

At Sapientia University (Romania) a control-group design was implemented (with a group of students learning with traditional, non-flipped methods). In this paper experiences and results from Romania will be presented.

3.1. Procedure

A group of 26 students enrolled the “Critical thinking” course, as part of curricula for BD students. In accordance with the curricula, the course activities were compounded with a 90-minute lecture (for all students), and two 90-min seminar with practical activities, for a subgroup of 14 (experimental group) and one of 12 students (control group). The organization of two subgroups for practical activities is the same for other classes as well.

During a 13-week semester, both groups participated altogether in the same 90-min lecture. Research results support that the best method to enhance CT is to teach its theoretical background [22].

The seminary activities of the experimental group were organized in accordance with the principles of flipped classroom. At the first seminar activity, students were introduced with the concept of flipped learning, were presented one of the 20-videos prepared in the project, and completed the related pre-tests, in order to familiarize with the method.



During the next 12 weeks students received an educational video per week for watching and the related pretest. Both groups attended the same lecture activities. At the seminar activities for the experimental group the teacher evaluated the test results, and organized interactive activities like group discussion, problem-based learning and case study. Students from the control group prepared 20-minute presentation on a selected topic; a maximum of two students presented their assigned topic followed by questions and eventual discussions coordinated by the teacher. This approach is quite common for seminary activities in other social science classes, so it is familiar to students.

In summary, the main difference between the experimental and the control group was the educational video and test before classes for the experimental group, and the more diverse and more interactive nature of seminary activities as compared to mostly frontal nature of student's presentations.

4. Results

4.1. Teacher's Experiences – Qualitative Data

After each seminar activity with the experimental group the teacher completed a report regarding the interactive methods used in the flipped classroom, also describing her general impressions regarding teaching and reactions of students – revealing spontaneous feed-backs related in relation to the classroom activities and task (collected for the experimental group).

In 7 of the 12 weekly reports the teacher mentioned that although interactive activities started with difficulties, when one of the students mentioned an opinion about the educational video of the specific week triggered the others to express their opinion, facilitating a more active participation (as related to the previous experience of the teacher). After each teaching unit the teacher mentioned that students were expecting the feedback of the pre-tests, and discussing the most common failures (as revealed by erroneous answers) become an expectation. Case studies were preferred as opposed to problem-based learning and group discussion.

Regarding students' engagement, the teacher reported that students were more engaged as compared to other seminar activities, and they were motivated to discuss the pre-test results and information learned from the educational videos.

4.2. Feedback From Students – Quantitative Data

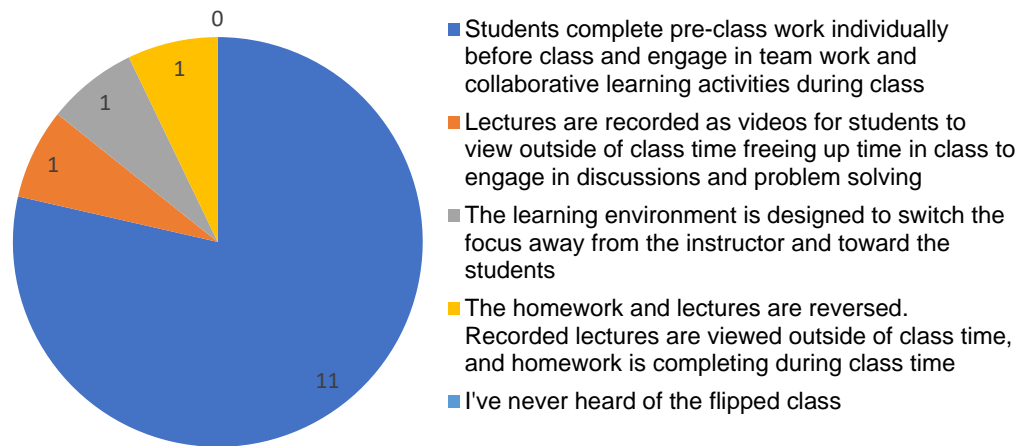
Students from the experimental and the control group were asked to complete an evaluation questionnaire online, composed of Likert-scale evaluation questions and an open question. The first question for the students from the experimental group asked about their definition of the Flipped Classroom; all the other questions were similar for the two groups.

Because of the reduced number of students from the two groups, mainly descriptive data will be provided. Since two partners are still pilot-implementing the educational materials, a project-level analysis will be effectuated starting from July, 2024.

The 14 students from the experimental group were asked to choose the definition(s) which are most appropriate for the flipped class. Results are presented in Chart 1.



Figure 1. Which of these definitions aligns with your interpretation of the flipped class? (Select all that apply.)



We can conclude that although the majority of students were aware about the nature of the flipped classroom method, some of them had not an accurate concept about its nature. In accordance with recommendations of researchers, a more detailed rationale and the motivation for the implementation of the flipped classroom facilitates students' engagement in the process [2, 15, 26].

All the experimental students responded with "yes" to the question "In general, did you notice any differences in seminary activities of the present course and other courses?". In the control group 4 students reported noticing a different approach, while 8 of them did not notice differences.

Students were also asked if they would like to learn with the experienced method on other courses, indicating their preference using a 5-point Likert-scale (not at all – very much). For the experimental group the average of ratings was of 3,78 when assigning 1-5 values to the scales, with 5-very much, while for the control group the average was 2,91. The t test indicates that the difference is significant ($p < 0,02$).

Answers to the Likert-scale question "Did the implemented method affect your level of comprehension during courses?" (1 – Not at all, 5 – It did for sure) the average for the experimental group was 4,35, while for the control group was 2.75. The difference is statistically significant ($p < 0,01$).

When comparing the interactive nature of classroom activities to other courses in social science using a Likert scale, students of the experimental group found the flipped class more interactive (average is 3,07, 1 – There were no differences, 5 – Classroom activities were more interactive). The average rating for experimental students is 2.91. The difference is not significant, as indicated by the t test.

Students also rated their experiences related to methods used in the seminary activities. The average rating for the experimental group is 3,07 on a Likert scale where negative rated with 1 and positive with 5; for the student group the average rating is 2.75. The difference is not significant.

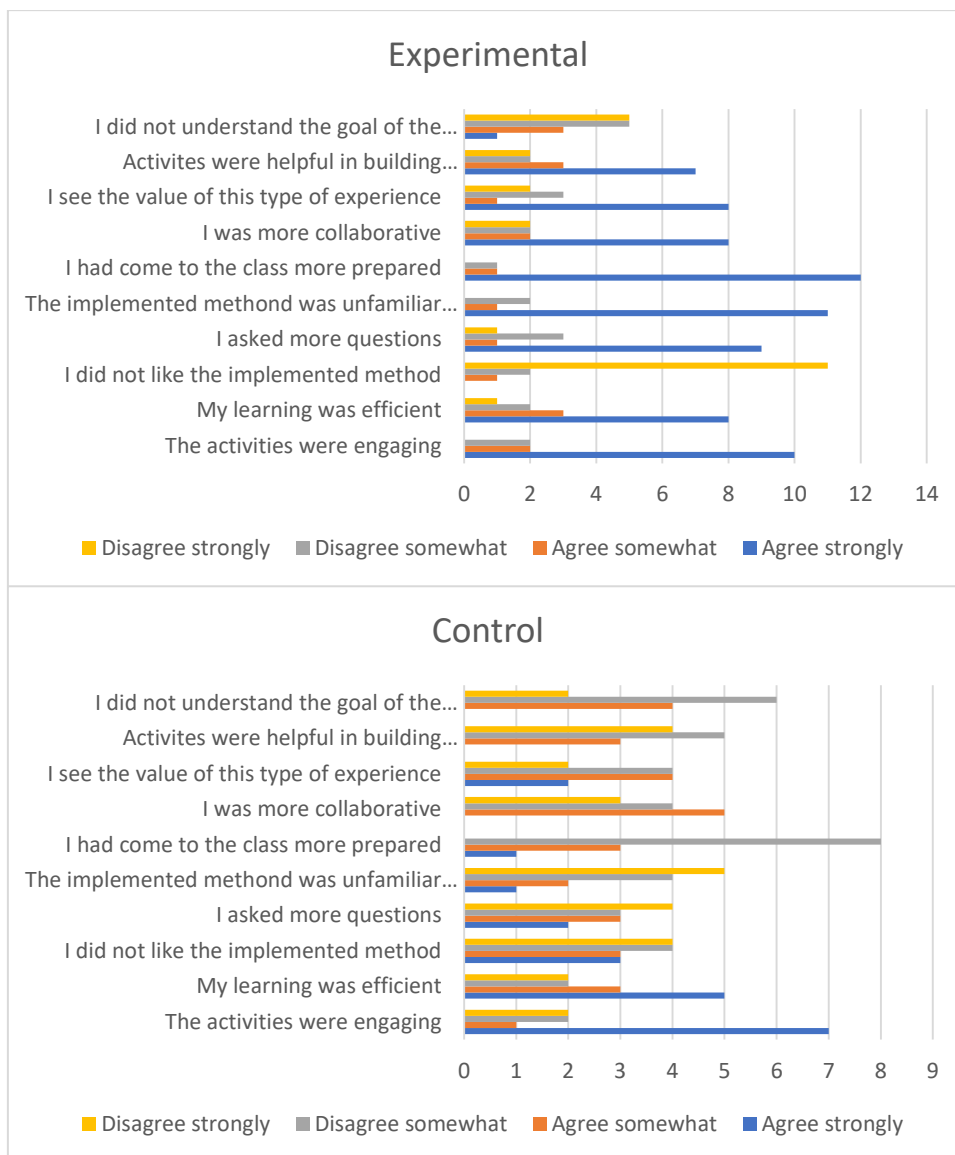
Students were asked to describe their general impressions about the seminar activities using an open-ended question. The answers were predominantly positive. Students from the experimental group mentioned that they "have spent more time with the subjects outside of classes because of the videos", "it was good that if I did not understand something from the videos or the test was discussed afterwards in class", classes in general were "cozier and more interesting". On the negative part, although they appreciated the video narrations, in some cases it was recommended that the videos should contain more animations and more vivid images, and should be narrated in more "plain language".

Students from the control group mentioned that the activities were useful for developing their presentation abilities, and after the presentations there were enjoyable "free" discussions and debates. They also mentioned that if the topic of the presentation was interesting preparing and presenting was more enjoyable.

Students from both groups were asked to rate their seminary-activities experience along several criteria. Results are presented in Figure 2.



Figure 2. Please rate your experiences related to seminar activities



5. Conclusions

Results are limited by the small number of students involved in the study. However, findings are in concordance with recommendations of the Flipped Classroom literature: the method is motivating; it gives a new atmosphere to the classroom.

We can conclude from student evaluations that educational videos are recommended to be constructed more professionally. It is therefore recommended to include professional video creators when developing educational videos – a practice that was not available in the CTIS project [15]. It is also recommended that educational videos to include real-life examples of provoking nature (with several possible interpretations).

In concordance with previous findings, results indicate that educational videos facilitated classroom interaction [2], and is motivating for students. They see the value of the Flipped Classroom experience and find their learning more efficient, would recommend this method to other courses.

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