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The Flipped Learning approach: quantitative research on the perception of Italian teachers

L'approccio Flipped Learning: un'indagine quantitativa sulle percezioni degli insegnanti italiani

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Abstract

The Flipped Learning (FL) approach is attracting increasing interest in schools of every kind and level. Although the research results seem promising, they often appear limited, not particularly rigorous, and occasionally contradictory. An international quantitative research has been conducted to identify the perception of teachers who regularly apply the FL approach concerning the impact of their teaching practices. The results of the survey carried out in Italy, show that students can work at their own pace and with the materials they consider appropriate in relation to their learning style, according to the teachers' perception. The cooperative approach and the use of educational technologies facilitate the development of relational and digital skills. While FL promotes students' participation, as well as inclusive and experiential teaching practices, the results highlight critical issues inherent to the accessibility of educational technologies, consistency in planning activities, as well as the involvement of colleagues and students' parents.

Keywords: flipped learning; flipped classroom; teachers; perceptions.

Abstract

L'approccio Flipped Learning (FL) riscontra un interesse crescente nelle scuole di ogni ordine e grado. Anche se i risultati delle ricerche sembrano promettenti, essi spesso appaiono limitati, non rigorosi e talvolta contraddittori. Una ricerca quantitativa internazionale è stata condotta al fine di identificare le percezioni degli insegnanti che applicano tale modello riguardo l'impatto delle loro pratiche didattiche. I risultati dell'indagine svolta in Italia, evidenziano come, secondo i docenti, gli studenti abbiano la possibilità di lavorare con ritmi e materiali che ritengono adeguati in relazione al proprio stile di apprendimento. L'approccio cooperativo e l'utilizzo delle tecnologie didattiche facilitano lo sviluppo delle competenze relazionali e digitali. Pur favorendo il FL la partecipazione attiva degli studenti, nonché la promozione di una didattica inclusiva ed esperienziale, si evidenziano criticità inerenti all'accessibilità delle tecnologie didattiche, il rilevante impegno nella progettazione delle attività, nonché il coinvolgimento dei colleghi e dei genitori degli studenti.

Parole chiave: apprendimento capovolto; classe capovolta; insegnanti; percezioni.

[1] Although it is a joint work, paragraphs 1, 3 and 5 can be attributed to Alessia Bevilacqua; paragraphs 2 and 4 can be attributed to Raúl Santiago Campión.

1. Introduction

Flipped Learning (FL), as recently defined by the Academy of Active Learning Arts and Sciences (http://aalasinternational.org/updated-definition-of-flipped-learning/) – "is a framework that enables educators to reach every student. The Flipped approach inverts the traditional classroom model by introducing course concepts before class, allowing educators to use class time to guide each student through active, practical, innovative applications of the course principles". It is, therefore, a pedagogical-didactic approach in which the transmission of knowledge moves from the learning space of the class to that of the individual. The class group becomes a dynamic and interactive environment, within which the teacher accompanies students in the application of previously learned concepts, involving them in creative research activities (Flipped Learning Network, 2014). This inversion of learning environments leads students to approach the lower levels of learning (acquiring knowledge and gaining understanding) independently outside the classroom and to focus on higher-level learning objectives during classroom activities with the support of teachers and tutors (Anderson, Krathwohl & Bloom, 2001).

A further terminological clarification seems appropriate: it is not correct to resort indistinctly to the expressions Flipped Classroom (FC) and Flipped Learning. While the former refers to the learning environment designed by the teacher and in which the students work and study, the latter concentrates on the learning processes activated by the students through multiple strategies proposed by the teacher. It is possible to speak of FL only if the experiences of the students and the teachers are strongly characterized by the presence of the four pillars – Flexible Learning, Learning Culture, Intentional Content and Professional Educators – as well the indicators that support this framework (Flipped Learning Network, 2014). Although the formalization of the FL approach has been attributed to Jonathan Bergmann and Aaron Sams (Tucker, 2012) – as clearly defined by Talbert (2017) – it is considered particularly interesting to point out that the first experiences conducted in the university environment (Lage, Platt & Treglia, 2000; Mazur & Hilborn, 1997; Tague & Baker, 2014) were planned to address and solve specific pedagogical problems arising in the daily practice of the traditional transmissive teaching approach.

If the first experiences date back to a recent period, this approach has deep pedagogical roots: besides the constructivism, constructionism and Deweyan activism (Dewey, 1938) usually evoked when talking about FL, it is fitting to directly or indirectly refer to the Deci and Ryan (2008) theory of self-determination, to the theory of cognitive load of Miller (1956), to the self-regulation of learning theory of Zimmerman (2002) and Pintrich (2004), the theory of proximal development zone of Vygotsky (1986), and to the implicit theories of Dweck's intelligence (2000). The reference to these theoretical frameworks – as explained by Bevilacqua (2018) – allows us to understand why and how the FL approach makes it easier to place students at the centre of their learning processes.

The FL approach seems to be receiving growing interest, as underlined by Talbert (2018). In Italy, where the research has been carried out, the experiences of flipped classroom and flipped learning are quite widespread in K-12 courses (https://flipnet.it/nuova-mappa/), as well as being disseminated through manuals (Cecchinato & Papa, 2016; Longo, 2016; Maglioni, 2018). Flipped experiences carried out in the university context are instead more sporadic, as explained by Bevilacqua (2018). Overall, many researchers – Hamdan, McKnight and McKnight (2013), Yarbro, Arfstrom, McKnight and McKnightet (2014)

and more recently Raffaghelli (2017) – point out that rigorous quantitative and qualitative research on FL is limited and mainly refers to higher education. Recent evidence from the scientific literature on the topic of FL stresses several positive elements in terms of impact. The FL approach makes it possible to communicate learning contents more easily (Hamdan, McKnight & McKnight, 2013), due to the adoption of cooperative and problem-based activities that promote an increase in students' attention, involvement and motivation (Abeysekera & Dawson, 2014; Blair, Maharaj & Primus, 2016; Davies, Dean & Ball, 2013). There is accompanied by a greater perception of self-efficacy (Kurt, 2017), a better interaction among students (Parker, Maor & Herrington 2013) and between teacher and students (Kahn, 2011), a positive attitude towards learning (Stone, 2012), a higher level of reflection and research (McLaughlin et al., 2013), an increase in study motivation (Davies et al., 2013). Seemingly, there are also better results in terms of learning (Love, Hodge, Grandgenett & Swift, 2014; Missildine, Fountain, Summers & Gosselin, 2013; Talley & Scherer, 2013).

According to Raffaghelli (2017), these results can only be achieved by considering certain limits and conditions, for example, the teachers' training, the technological infrastructures, and the students' support during independent activity or homework. On the contrary, other studies show no significant difference between FL and traditional learning environments (Findlay-Thompson & Mombourquette, 2014). Furthermore, Van Vliet, Winnips and Brouwer (2015) underscore that FL leads to a gain in terms of both metacognition and collaborative learning strategies, but that these achievements are not lasting.

2. Methodological framework

2.1. Data-gathering tool design

The Bologna Process and the development of the European Higher Education Area (EHEA) have led to a change in the teaching-learning process model. The methodological principles and the ECTS mark a shift from a teacher-centred model to a learner-centred system. The ECTS credit is defined as a transfer and accumulation system and measures a student's workload required to acquire the necessary competencies for the qualification which is teacher training for secondary schools, a baccalaureate, or a vocational skill level (EU, 2015). This global, multidimensional approach must necessarily be accompanied by methodological changes in the classroom. Which means the use of active, inductive and collaborative methodologies such as the FL approach. Furthermore, this new approach requires detailed planning of in-class sessions and preparation of a well-designed teaching programme for the ultimate goal of ensuring that students acquire the appropriate competencies to improve their employability and future skills. The question that gave birth to the research project is: What are the perceptions of teachers who apply the FL approach concerning their daily practice in the classroom? The main objective of the research was to identify meaningful elements that help reconstruct an interpretive framework of the teachers' perceptions concerning their teaching practices, the students' learning processes, the relational dimension, the use of educational technologies, as well as the benefits, challenges, and obstacles of the FL approach.

The validated Flipped Classroom Model Perception Survey – Teachers (Santiago & Bergmann, 2018) was used as a data-collection instrument. The questionnaire tool was

adopted as an information collection instrument since it was considered an appropriate strategy to obtain data quickly and accurately for the aim of this study. The questionnaire was designed by two of the leading teams in the Flipped Learning Global Initiative (FLGI). The process to select the key dimensions for the design and validation of the tool consisted of the following phases:

1. First draft. The object of research was defined; the dimensions of the framework were based on a previous study carried out by Driscoll (2012). The necessary descriptors established by the FL model were also defined. The more than 10 years' experience of the researchers in teacher training in the FL model was taken into account when designing this tool;
2. Second draft. The dimensions indicated in the first draft were sorted into groups proposed by the coordination team; items were defined according to the ratio of indicators: general questions (age, subject, etc.), pedagogical issues (students´ interaction, differentiation, critical thinking skills, etc.) and technical problems (authoring tools, video creation, etc.);
3. Third draft. The coordinating group reviewed the items in order to adapt them to the dimensions that had been identified;
4. The instrument was validated by external judges, experts in the model and in measuring techniques, and experts belonging to different branches of educational sciences, in accordance with pertinence, relevance, and clarity;
5. The final evaluation instrument was constructed including appropriate modifications, according to the quantitative and qualitative analyses proposed by the expert judges;
6. The first pilot project which included a small sample of approximately 50 teachers carried out an analysis of the validity and reliability of the items. It is important to confirm the validity and reliability of the tool used. To this end, the Cronbach alpha statistical coefficient was used. The closer the Cronbach alpha is to 1, the greater the internal consistency of the items analysed (Gliem & Gliem, 2003; George & Mallery, 2002). A Cronbach alpha of 0.886 was obtained;
7. The questionnaire was translated into different languages (English, Spanish, Chinese, Italian, French, Hungarian, and German). Back translation verification was required for this process.

2.2. The structure of the questionnaire

The questionnaire consisted of 38 questions. The first 11 questions aimed to investigate population data, including "Educational level at which he/she teaches", "Years of teaching experience", "School ownership", "School context" and "Percentage of economically disadvantaged students". The following 27 questions reflected the teachers' perceptions of the FL model. 14 items referred to technical aspects, another 13 investigated methodological and organizational issues. Multiple-choice and Likert scales of 1 to 5 were preferred for the questions, where 1 corresponded to a low level of identification with the proposed sentence. Three open questions aimed at investigating the benefits and obstacles of the FL approach, as well as a description of personal experiences of FL were also included. The questionnaire was administered using the SurveyMonkey platform. Despite being lengthy, it was easy to answer, within an average time of ten minutes.

2.3. The data gathering and analysis processes

The questionnaire was first presented through the FLGI website, and then through the website of the Italian association for the promotion of the flipped classroom (https://flipnet.it/nuova-mappa/), and the social networks linked to them. The period dedicated to the data collection was March-September 2019.

The data analysis was carried out using software called *IBM Statistical Package for the Social Sciences*. The statistical analysis included:

- a descriptive statistical analysis of the teachers' perception of their application of the FL approach;
- a correlational study, to check whether the levels of the variables associated with the characteristics of the respondents influenced the variables corresponding to the items on technical and methodological aspects. This study was carried out through an Independence Test with the $\chi 2$, also called 'chi-square', in which frequencies of expected events and frequencies of observed events are compared.

This paper specifically includes the results of the descriptive statistical analysis.

3. Results

3.1. Sample characteristics

The survey was answered by 356 teachers working in Italian schools of every level and type. Concerning the sample, it is important to note that, for several reasons, it cannot be considered representative of Italian teaching staff. First and foremost, the investigation was conducted and promoted online (website, mailing lists, and social networks), facilitating the participation of teachers who are more au fait with technology. In addition, the teachers' participation was voluntary: this implies that the survey might well have attracted mostly teachers who have positive opinions concerning the FL approach. Hence the sample might mainly include teachers who have had a positive experience: it is in this light that the results presented below must be considered.

The questionnaire was completed by 309 females (86.8%) and 47 males (13.2%). Considering all the respondents, 46.6% state that they have been teaching for more than twenty years, 36.8% for 10 to 20 years, 7.6% 3 to 5 years, 7.9% 5 to 10 years, and 1.1% for less than three years. It is, therefore, possible to deduce that most of the teachers who choose the FL approach are those with significant teaching experience.

The respondent teachers worked mainly in upper secondary (40.4%), lower secondary (30.6%) and primary (27.5%) schools; very few teachers worked in higher education (1.1%) and vocational education and training (0.3%). Almost all of the former were public schools (96.1%), some were charter schools (2.8%), only 1.1% were private schools. When it came to the geographical location of the schools where FL had been tried out, there seemed to be no relevant differences: 40.2% of the schools were in northern Italy, 31.7% in the centre, 28.1% in the south. On the contrary, they were predominantly in urban areas (61.0%) and less frequently in suburban (21.6%) and rural areas (17.4%). On analysing the data concerning economic hardship, most of the students (53.7%) presented no or little disadvantage, 34.8% were quite disadvantaged students, few students were very (6.5%) or severely (5.1%) disadvantaged from an economic point of view.

3.2. Teaching practices

With regard to the number of years using the FL approach, most of the teachers (43.3%) declared that they had been using it for one to three years; 6.5% said they had been using it for more than five years and 18.8% for three to five years; 12.9% had been using it for less than a year, while 18.5% flipped only a few lessons.

The answers concerning the teaching practices highlight that FL was being applied in many school subjects. For example those within linguistic-artistic-expressive areas (Italian, EU languages, Music, Art and Image, Sports and Physical Education) were those most frequently flipped (219; 35.0%); followed by subjects in the historical-geographical area, i.e. Geohistory, Geography and History (207; 33.1%); then 24.3% (152) of the flipped subjects were among the natural and experimental sciences (Mathematics, Natural and Experimental Sciences, Technology); within the economic-legal sphere (16; 2.6%), the humanist disciplines (27; 4.3%), while in other learning contexts (5; 0.8%) there were fewer experiences of FL. In addition, the data were prepared in a disaggregated form by school grade. Figure 1 shows that language-artistic-expressive (30.6% primary school; 31.9% lower secondary; 37.6% upper secondary) and natural and experimental science (39.2% primary school; 30.4% lower secondary; 30.4% upper secondary) disciplines were flipped equally by the different school levels. Historical-geographical disciplines presented a similar distribution, but subjects were also flipped within Vocational Education and Training courses (37.6% primary school; 38.6% lower secondary; 23.3% upper secondary; 0.5%: VET). Economic-legal disciplines were mostly flipped at upper secondary (59.3%), even they were still present at lower secondary (10.0%) and in higher education (5.0%). Humanistic disciplines were mainly flipped at the upper secondary (59.3%) and in higher education (22.2%), but they were still present at primary (14.8%) and lower secondary levels (3.7%). The disaggregated data must obviously be read considering the different participation of teachers working mainly at primary and secondary schools.

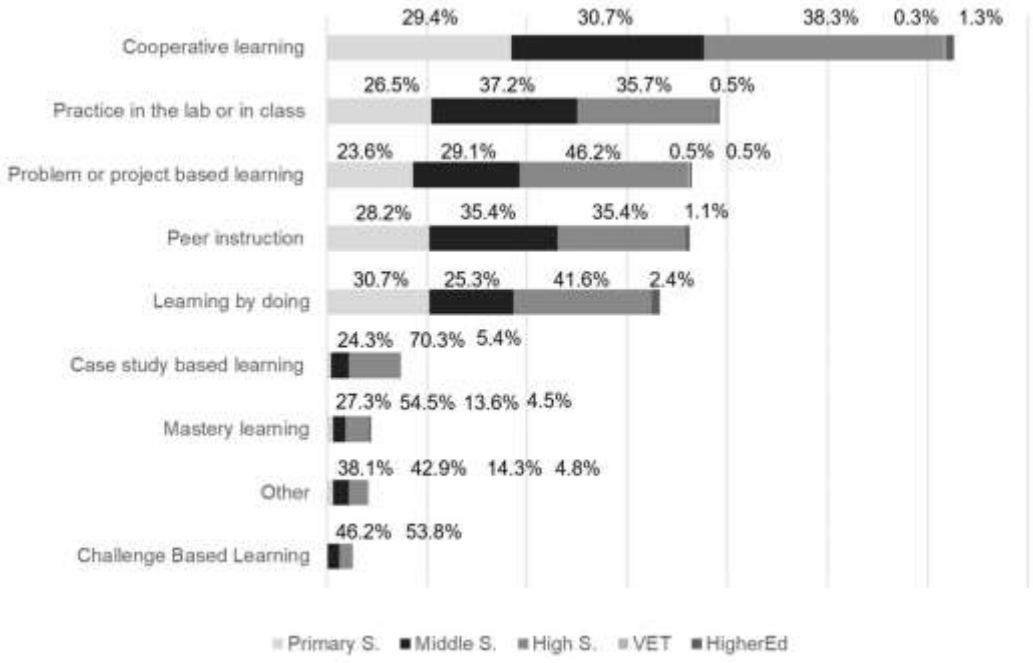

Figure 1. Distribution of the disciplines where FL is applied.

As shown in Figure 2, the active teaching strategies that teachers used in the classroom were multiple: cooperative learning (313; 27.7%); practice in the lab or in class (196; 17.4%); problem- or project-based learning (182; 16.1%); peer instruction (181; 16.0%); learning-by-doing (166; 14.7%); case study based learning (37; 3.3%); mastery learning (22; 1.9%); challenge-based learning (13; 1.2%), others (19; 1.7%). Among other strategies, books and digital whiteboard were mentioned. The disaggregated data underscored that cooperative (upper secondary: 38.3%; lower secondary: 30.7%; primary: 29.4%; higher ed.: 1.3%; VET: 0.3%) and problem/project-based learning (upper secondary: 46.2%; lower secondary: 29.1%; primary: 23.6%; VET: 0.5%; higher ed.: 0.5%) were implemented in schools of every level, although with a non-homogeneous distribution. Practice in the lab or in class (lower secondary: 37.2%; upper: 35.7%; primary: 26.5%; higher ed.: 0.5%), Peer instruction (lower and upper secondary: 35.4%; primary: 28.2%; higher ed.: 1.1%), Learning-by-doing (upper secondary: 41.6%; primary: 30.7%; lower secondary: 25.3%; higher ed.: 2.4%) and Mastery learning (upper secondary: 54.5%; lower secondary: 27.3%; primary: 13.6%; higher ed.: 4.5%) are used mainly in primary and secondary schools. The strategies less frequently adopted by flipped teachers were Study-Based Learning (upper secondary: 70.3%; lower secondary: 24.3%; primary: 5.4%) and Challenge-Based Learning (upper secondary: 53.8%; lower secondary: 46.2%).

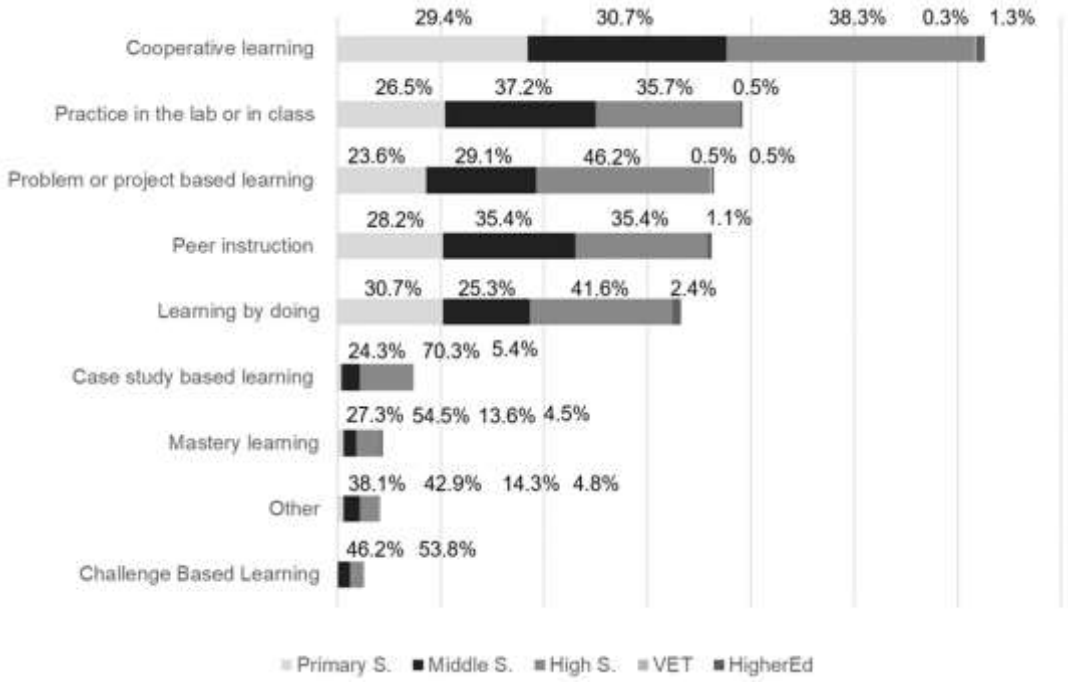

Figure 2. Distribution of the active teaching strategies adopted within the FL approach.

The results of the questionnaire also highlight that the FL approach has a significant positive effect on the implementation of strategies to personalize students' learning processes. Most of the teachers (248; 69.7%) stated they were better able to differentiate through FL, while 26.6% affirmed that they were able to differentiate slightly better, while only 3.6% were barely able or unable to differentiate better.

It is also important to consider the relationships of the teachers who applied FL with their principals. It can be seen in Figure 3 that for 26.1% their principals seemed aware yet

neutral. 37.6% of the respondents recognized some degree of support: for some teachers (18.8%), their principals were very supportive and actively worked to have more classes flipped, for some others (18.8%) they were supportive in words, but the teachers were still 'going it alone'. 16.6% of the teachers said that their principals were not even aware that they were flipping. 15.4% of the respondents feel they are very supportive of their flipping but are not working to popularize 'flipping' in other classes. It is noteworthy that only a few teachers encountered totally positive or negative situations when applying FL: 2.8% felt that their principals were openly hostile to what they were doing; on the contrary, 1.4% worked in a flipped school, where FL was the established practice.

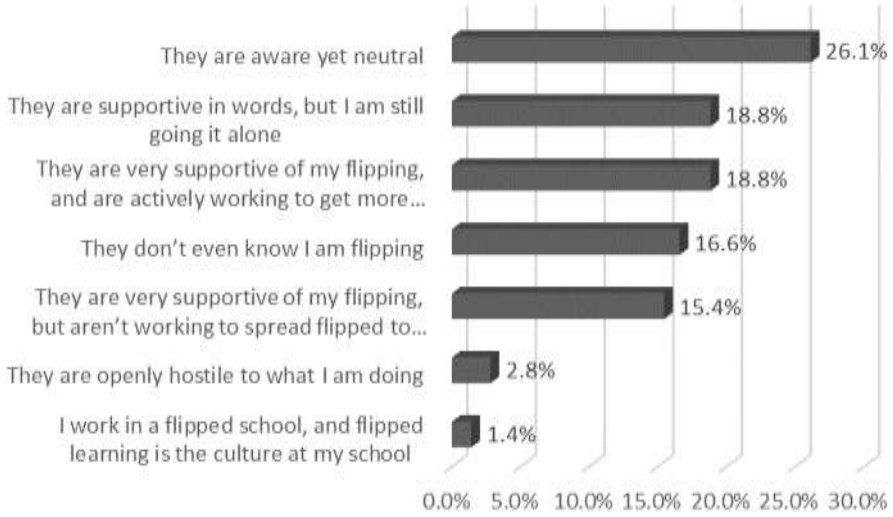

Figure 3. Distribution of the teachers' perception concerning their principals' opinion on the FL approach.

3.3. Students' learning processes

One of the main results concerning students' learning processes – according to the teachers' perceptions – emphasized the possibility for students to work at their own pace (4-5: 75.5%). Only 21.9% affirmed that they were able or could do this (2-3), while 2.5% were unable or incapable (0-1). As shown in Figure 4, the highest score was found in the primary (31.8%), lower secondary (30.6%) and upper secondary (35.8%) equally, while higher education (1.5%) was minimally represented. In both cases, the students who seemed to be struggling most, in the eyes of the teachers, were those attending upper secondaries (2-3: 52.5%; 0-1: 77.8%).

	Primary school	Lower secondary	Upper secondary	VET	Higher Ed.	TOTAL
0-1	11.1%	11.1%	77.8%	0.0%	0.0%	100.0%
2-3	13.8%	32.3%	52.5%	1.4%	0.0%	100.0%
4-5	32.6%	30.6%	35.4%	0.0%	1.5%	100.0%

Figure 4. Distribution of teachers' opinions concerning the possibility for students to work at their own pace.

According to 62.4%, students have more opportunities to make decisions about their learning (4-5), for 34.3%, students have a moderate possibility of doing so (2-3), for

3.3%, students have little or no possibility to do so (0-1). Even in this case (Figure 5), the most positive results were mainly distributed between primary, lower secondary, and upper secondary; on the contrary, the less positive results mainly concerned upper secondaries.

	Primary school	Lower secondary	Upper secondary	VET	Higher Ed.	TOTAL
0-1	22.2%	11.1%	66.7%	0.0%	0.0%	100.0%
2-3	22.3%	32.8%	44.1%	0.0%	0.9%	100.0%
4-5	31.6%	30.3%	36.2%	0.5%	1.4%	100.0%

Figure 5. Distribution of teachers' opinions concerning the possibility for students to make decisions about their learning.

The survey results also highlighted that with FL, students can generally choose the type of subjects that best fit their learning style (59.8%), 25.1% students feel they can do this often enough (2-3), and 5.1% that they can do so only a few times (0-1). The disaggregated data (Figure 6) do not present any significant differences between school levels in the highest scores but show that the intermediate and lower scores are mainly attributable to upper secondaries (2-3: 47.0%; 0-1: 50.0%).

	Primary school	Lower secondary	Upper secondary	VET	Higher Ed.	TOTAL
0-1	31.3%	18.8%	50.0%	0.0%	0.0%	100.0%
2-3	21.2%	31.2%	47.0%	0.6%	0.0%	100.0%
4-5	31.8%	30.6%	35.8%	0.0%	2.0%	100.0%

Figure 6. Distribution of teachers' opinions concerning the possibility for students to choose the type of subject that best fits their learning style.

The results show that 75.0% of teachers declare that students definitely have better access to learning materials (4-5), while according to 23.6%, students have moderate access (2-3), and for 1.4%, students do not have better access to learning materials, or only on a few occasions, (0-1). As shown in Figure 7, most respondents (81.5%) would agree that students have more opportunities to work with other students in the class (4-5), while 16.0% feel they have sufficient opportunities (2-3), while 2.6% feel they have few opportunities or none at all (0-1).

	Primary school	Lower secondary	Upper secondary	VET	Higher Ed.	TOTAL
0-1	42.9%	0.0%	42.9%	0.0%	14.3%	100.0%
2-3	33.3%	34.0%	31.4%	0.0%	1.3%	100.0%
4-5	25.1%	31.0%	42.8%	0.3%	0.7%	100.0%

Figure 7. Distribution of teachers' opinions concerning the possibility for students to access learning materials.

The data also indicate that, according to the teachers who responded, students' learning is more active and experiential (79.5%), that it is moderately active and experiential (18.5%), that it is barely or not at all active and experiential (1.9%). In this case, Figure 8 shows no significant differences between the school levels for the highest scores but significantly higher percentages attributable to upper secondaries when it comes to intermediate and lower scores (2-3: 52.7%; 0-1: 80.0%).

67.7% of the respondents felt that students' critical thinking skills were enhanced (4-5), 29.5% were moderately enhanced (2-3), and 2.8% that these skills were slightly enhanced

(0-1). Overall, the disaggregated data show no significant differences between the school levels.

	Primary school	Lower secondary	Upper secondary	VET	Higher Ed.	TOTAL
0-1	0.0%	20.0%	80.0%	0.0%	0.0%	100.0%
2-3	14.8%	30.8%	52.7%	0.0%	1.6%	100.0%
4-5	31.3%	30.3%	36.8%	0.4%	1.2%	100.0%

Figure 8. Distribution of teachers' opinions concerning the possibility for students to experience active learning.

FL seems to have a significant positive effect on students when it comes to demonstrating mastery of content in a variety of ways (69.1%); this was quite possible for 28.1% of teachers, and this was barely or not at all possible for 2.8% of teachers. Even in this case (Figure 9), while the higher scores are well distributed among the first three school levels, the intermediate and lower scores are mainly attributable to upper secondaries (2-3: 50.0%; 0-1: 62.5%).

	Primary school	Lower secondary	Upper secondary	VET	Higher Ed.	TOT
0-1	12.5%	25.0%	62.5%	0.0%	0.0%	100.0%
2-3	17.6%	29.5%	50.0%	0.7%	2.2%	100.0%
4-5	32.9%	30.8%	35.4%	0.0%	0.9%	100.0%

Figure 9. Distribution of teachers' opinions concerning the possibility for students to demonstrate mastery of content in a variety of ways

Lastly, in analysing how much time students are used to spending on FC homework, 42.5% of teachers reported less or much less compared to other subjects, 31.7% similar, and 25.8% more or much more. On this aspect, the disaggregated data show no significant differences between the school levels.

3.4. Relational dimension

Most teachers (79.2%) would agree that interactions with students during the class are more frequent and positive (4-5), 19.7% report that this is quite frequent (2-3), while 1.1% state that this rarely happens (0-1). Similarly, their relationships with students also seem to be improved with FL, according to 71.3%; for 24.5% relationships are moderately improved, while for 4.2% relationships show little or no improvement.

For most teachers, FL also positively influenced student-to-student interactions. For 68.2%, interactions are more frequent and positive, for 28.9% they have become moderately positive and frequent, for 2.8%, interactions show little or no improvement.

3.5. Use of educational technologies

The last group of items dealt with the importance of educational technologies in the FL approach, both for activities in individual spaces, and those implemented in group spaces.

The tools that teachers usually need to produce their videos: presentation to video (26.2%), screen cast (23.7%), software internet (15.1%), live lesson (10.8%), light board (10.4%), chromakey (0.6%), top-down document camera (0.6%). Among the other tools (12.6%) adopted to create videos, teachers reported using web apps (Adobe Spark, Apowersoft, Digital Lesson, Ed Puzzle, Educreation, Edupuppet, Explain Everything,

Filmora, Imovie, Kizoa, Lensoo, Powtoon, Prezi, Sfogliami, Videoscribe) (34.2%), YouTube video (24.1%), internet video with no specified source (20.3%), digital whiteboards (6.3%), PowerPoint slides (6.3%), videos from publishing companies (1.3%), graphic tablets (1.3%), interactive monitors (1.3%), voice messages (1.3%), audio documents produced by the students (1.3%), films (1.3%), materials proposed by the students (1.3%).

According to the respondent teachers, the device used most by their students for working with flipped materials is the phone (40.7%), the tablet (22.8%), the computer (21.1%) and the laptop (14.6%); among the other devices (0.8%), digital whiteboards and books were mentioned.

Focusing the attention on flipped videos, most teachers (42.0%) say that these are 5-8 minutes long, for 26.8%, they last 2-4 minutes, for 19.2%, they last 9-12 minutes, for 7.0%, they last 13-15 minutes, while for 7.0% they last more than 15 minutes. 3.9% of teachers declared that they do not flip with videos.

Regarding the time spent by students working on a flipped video, 65.6% of teachers state that this is approximately 50% more than the video length; 24.3% approximately 100% more than the video length; and 10.2% approximately 200% more than the video length.

Analysing then how much time *flipped homework* (YouTube, social networks, games, research, etc.) affects the students' total 'screen time', it can be assumed that it adds some time to their screen time (39.1%), it adds a small amount of time to their screen time (37.1%), it replaces other screen time activities (20.7%), while for 3.2% it adds a large amount to their screen time.

Lastly, 65.5% of teachers explained that students have to answer some questions post video, 22.5% some questions must be answered during the video and questions that must be answered during the video (2.3%); 9.6% of teachers reported no questions to be answered.

3.6. Benefits of the FL approach

According to the respondents, the advantages of FL are perceived particularly in the classroom, where teachers can enjoy more time to carry out high-quality activities (45 excerpts). This approach facilitates the active participation and involvement of the students (122), and an increase in motivation (36): the students are asked to put into practice theoretical concepts learned previously by means of authentic tasks (23). This process is frequently accompanied by periods of in-depth analysis, reflection, and discussion (14). Students can take part in a co-construction of knowledge through collaborative and cooperative-based activities (39). Having the possibility to constantly monitor the progress of activities (7), teachers can also propose individualized and personalized learning pathways (36), while facilitating the inclusion not only of students with special educational needs but also of those with educational fragilities (47). In both individual and group spaces, students can work at the pace they consider most appropriate (38). Another added value perceived by the teachers is the possibility of creating specific learning objects in relation to the objectives (15). The students' gains are finally explained: the teachers highlight positive results in relation to the acquisition of knowledge (45), but also skills (8) and transversal skills (2). When it comes to transversal skills, teachers can go into the details. Through the FL approach, students can valorize digital competence (8), learning to learn competence (11), personal competencies (i.e. greater awareness of themselves and their own learning processes: 27; autonomy and a

sense of responsibility: 23; critical spirit: 14); citizenship competence (4), and expression competence (2). Lastly, the results stress stronger and more authentic relationships between the teacher and the students and between the students themselves (33), with a consequent improvement in both school wellbeing (11) and in the personal wellbeing of the teachers (6).

3.7. Challenges and obstacles of the FL approach

The teachers' answers stress firstly the challenge of change (22 excerpts), in the face of which colleagues (73), headmasters (6), parents (59), and students (26) appear reluctant to become seriously involved. Many difficulties are linked to the availability of functioning educational technologies, both at school (54) and at home (39). Inadequate school environments (4) are also included in the list of obstacles. Concerning the FC project and implementation, teachers highlight the significant commitment required, in the preparation of the preliminary materials (84) the support of students' autonomy in carrying out their activities (38), the management of in-class activities (8) and teamwork (6), and the finding of appropriate assessment practices (10). Specific training is required concerning the concrete strategies to implement the FL approach and the use of educational technologies.

4. Conclusions

The FL approach, associated with the use of digital technologies in the teaching-learning process, is considered a ground-breaking way of stimulating learning. In this paper, the results of the survey highlight how students can discover an active, significant and deeper approach to learning, which leads them to take informed decisions, to enjoy greater collaboration with their classmates and have a more positive interaction with the teachers, compared to other teaching models. The respondents perceived an improvement in students´ learning processes, which can be adapted to their individual pace, and which allows them to select their materials and check their progress. As has been observed in other research studies (Santiago & Bergmann, 2018), the FL approach requires clear instructions at the beginning, as well as a self-reliant attitude and the ability to postpone any doubts and queries until class time; in general, students are not accustomed to situations of this type. However, at that point, in-class activities become significant and operative. One aspect of FL that is particularly appreciated is the in-class collaborative work, even if students occasionally request that the assessment should be based solely on teamwork. Finally, digital tools not only facilitate the students' learning process but also indirectly allow them to train in digital competencies. The strengthening of this key competence is highly valued, as it generally makes learning enjoyable, offers creative possibilities and, using gamified questionnaires, enables students to assess their own progress throughout the course.

The results obtained in the Italian context might be considered more interesting and understandable if read with a broader overview. Indeed further insights can be reached through a comparison with other contexts where data analysis has already been completed (the Spanish case with 494 answers, and the English case with 339 answers) (Santiago & Bergmann, 2018). The overall international results will be presented in a succinct but comprehensive way, to detect any correspondences or divergences.

As detailed in Figure 10, flipping scientific and experimental subjects seem to be preferred by English-speaking and Spanish-speaking teachers. Italian educators tend to opt for subjects relating to the historical-geographical area. In general terms, the cooperative approach seems to be the preferred strategy for both Italian and English teachers, followed by practice in the lab or in class, while Spanish teachers prefer Project- or Problem-Based Learning. There is full agreement on the number of years of applying FL, which is 1 to 5 years in the three studies carried out, followed by the option of 3 to 5 years.

	Italian context	**English context**	**Spanish context**
Learning Strategies	Cooperative 88.02% Practice 55.15%	Cooperative 71.55% Practice 60.67%	PBL 65.66% Cooperative 62.63%
Years applying FL	1 to 3 years 43.73% 3 to 5 years 18.66%	1 to 3 years 38.08% 3 to 5 years 25.10%	1 to 3 years 39.39% 3 to 5 years 26.24%
Interactions in class	$\overline{X}$ = 4.12	$\overline{X}$ = 4.49	$\overline{X}$ = 4.24
Student to student interaction	$\overline{X}$ = 3.87	$\overline{X}$ = 4.15	$\overline{X}$ = 4.08
Materials access	$\overline{X}$ = 4.13	$\overline{X}$ =4.38	$\overline{X}$ = 4.16
Choosing type of materials	$\overline{X}$ = 3.71	$\overline{X}$ =3.67	$\overline{X}$ = 3.45
Working at own pace	$\overline{X}$ = 4.08	$\overline{X}$ = 3.74	$\overline{X}$ = 3.92
Demonstrating mastery	$\overline{X}$ = 4.00	$\overline{X}$ = 3.54	$\overline{X}$ = 3.86
Working with others	$\overline{X}$ = 4.31	$\overline{X}$ = 4.51	$\overline{X}$ = 4.35
Decisions about learning	$\overline{X}$ = 3.81	$\overline{X}$ = 3.89	$\overline{X}$ = 4.06
Enhancing critical thinking	$\overline{X}$ = 3.89	$\overline{X}$ = 4.09	$\overline{X}$ = 3.90
Learning more active	$\overline{X}$ = 4.18	$\overline{X}$ = 4.36	$\overline{X}$ = 4.46
Differ. Strategies	$\overline{X}$ = 3.91	$\overline{X}$ = 4.26	$\overline{X}$ = 3.91
Better relationships	$\overline{X}$ = 3.98	$\overline{X}$ = 4.36	$\overline{X}$ = 4.07
Time spent on homework compared to other subjects	Similar 35.96% Less 32.02%	Similar 37.82% Less 27.73%	More 31.31% Similar 38.38%
Screen time	Adds little 38.92% Adds some 37.50%	Adds little 42.02% Adds some 36.13%	Adds little 52.53% Replaces 24.24%
Device used	Phone 39.28% Tablet 22.84%	Laptop 42.26% Phone 25.10%	Laptop 45.45% Computer 23.23%
Video Length	5-8 minutes 41.78% 9-12 minutes 26.74%	5-8 minutes 41.00% 9-12 minutes 25.10%	5-8 minutes 38.38% 9-12 minutes 26.21%
Video Type	Pres to video 48.55% Screencast 44.22%	Screencast 52.54% Pres to video 39.83%	Screencast 57.61% Pres to video 48.55%
Time spent on videos	50% more than the video 65.68%	50% more than the video 64.68%	50% more than the video 62.92%
Questions on the video	Post video 65.51%	Post video 46.84%	Post video 56.52%
Principals' opinion and support	Neutral 25.91% Only words 18.94%	Supportive and more 40.21% Supportive but not more 18.56%	Supportive but not more 30.94% Supportive and more 24.22%

Figure 10. A comparison between Italian teachers and colleagues from English- and Spanish-speaking countries.

Regarding the pedagogical aspects of the FL approach, it is worth pointing out that these are highly valued in all three studies with a value higher than 4 in most cases. Above all, when it comes to the active component, the way in which interaction with students can be

enhanced, relationships with students can be improved, and the fact that the students have more time to work with others (which is linked to the cooperative learning strategies mentioned earlier). As mentioned earlier, there is major agreement in the studies, showing that teachers from different countries share the same opinions when describing the advantages of FL.

There are other technical aspects which seem worth analysing. The time spent on homework as a result of using FL is *like that for other subjects* in the English and Italian studies, while it is *more* in the Spanish one. One important aspect for parents is the time spent on screen, which ought to be higher when teachers ask students to complete digital tasks such as watching a video or working with an interactive text. In all three studies, the preferred option was *adds little time*. Some differences can be perceived when teachers express their options on the devices used by the students. While the English and Spanish students were using *Laptops*, the Italians preferred to use their *smartphones*. The second choice was *Tablets* for the latter and *Phones* and *Computers* for the English and Spanish students, respectively. When video was adopted as the media content, the video length was the same for all the studies, i.e., *5 to 8* minutes. The time spent on videos was *50% more* than their running time. The teachers fully agreed on including questions during or after the video.

Finally, there seem to be some discrepancies concerning the opinions and support offered by the teachers' principals. For the Italian teachers, their principals were *neutral,* or only *supported them with words*, while the English-speaking teachers thought that they were supportive and wanted to use FL for other subjects, while the Spanish speakers had the same opinions, but in inverse order.

5. Discussion

The paper presents research aimed at identifying and understanding the perception of teachers who apply the FL approach from primary school to higher education, concerning the impact on their daily teaching practices. The added value of this investigation, considering the updated literature in the pedagogical field, lies both in the extent of the sample, and in the international overview adopted to read and understand the results. While the positive results are consistent with the literature concerning the study of teachers' perceptions, further research aimed at verifying the efficacy of the FL approach through empirical studies is needed. The results of the questionnaire present very interesting issues that deserve further investigation.

In the first place, it is considered necessary to further extend the inquiry to 'non-visible' school grades (VET and higher education): is the FL approach not yet practised in these contexts or have these experiences not been recorded?

Secondly, the application of the FL approach and the multiple teaching strategies which have been cited by the different school levels – i.e., mastery learning at primary and secondary school, as well as in higher education – require in-depth analysis.

A burning topic is the use of educational technologies at school: how to combine national and local guidelines, which often include restrictions on this aspect, with the extensive use of BYOD (bring your own device) approaches that FL entails?

From the results an apparent contradiction seems to emerge which needs to be investigated and clarified: on the one hand, 'flipped teachers' see students reluctant to

become seriously involved; on the other, the students appear heavily engaged and motivated. Where and why does this change occur?

Lastly, the teachers highlighted the significant commitment required, both in the preparation of the preliminary materials and for the management of in-class activities: what kind of training and support could be useful to teachers for the sustainable application of the FL approach?

Reference list

Abeysekera, L., & Dawson, P. (2014). Motivation and cognitive load in the flipped classroom: Definition, rationale and a call for research. *Higher Education Research & Development, 34*(1), 1–14. https://doi.org/10.1080/07294360.2014.934336 (ver. 15.07.2019).

Academy of Active Learning Arts and Sciences (2018). *Updated definition of flipped learning.* http://aalasinternational.org/updated-definition-of-flipped-learning/ (ver. 15.07.2019).

Anderson, L.W., Krathwohl, D., & Bloom, B.S. (2001). *A taxonomy for learning, teaching, and assessing: a revision of Bloom's taxonomy of educational objectives*. New York, NY: Longman.

Bevilacqua, A. (2018), *Flipped learning in ambito universitario. Presupposti e indicazioni pedagogico-didattici tra implementazione e ricerca*, PensaMultimedia, Lecce.

Blair, E., Maharaj, C., & Primus S. (2016) Performance and perception in the flipped classroom. *Education and Information Technologies, 21*(6), 1465–1482. https://doi.org/10.1007/s10639-015-9393-5 (ver. 15.07.2019).

Cecchinato, G., & Papa, R. (2016). *Flipped classroom. Un nuovo modo di insegnare e apprendere*. Torino: UTET.

Davies, R.S., Dean, D.L., & Ball, N. (2013). Flipping the classroom and instructional technology integration in a college-level information systems spreadsheet course. *Educational Technology Research and Development, 61*(4), 563–580. https://doi.org/10.1007/s11423-013-9305-6 (ver. 15.07.2019).

Deci, E.L., & Ryan, R.M. (2008). Self-determination theory: A macrotheory of human motivation, development and health. *Canadian Psychology, 49*(3), 182–185. https://doi.org/10.1037/a0012801 (ver. 15.07.2019).

Dewey, J. (1938). *Experience and Education*. Indianapolis: Kappa Delta Pi.

Driscoll, T.F. (2012). *Flipped Learning & Democratic Education*. Graduate Thesis Columbia University, USA.

Dweck, C.S. (2000). *Self-theories: Their role in motivation, personality, and development*. UK: Taylor & Francis Ltd, Hove.

EU. European Union (2015). *ECTS users' guide*. Luxembourg: Publications Office of the European Union. https://publications.europa.eu/en/publication-detail/-/publication/da7467e6-8450-11e5-b8b7-01aa75ed71a1 (ver. 15.07.2019).

Findlay-Thompson, S., & Mombourquette, P. (2014). Evaluation of a flipped classroom in an undergraduate business course. *Business Education and Accreditation*, *6*(1), 95–108. https://doi.org/10.1080/08832323.1963.10116709 (ver. 15.07.2019).

Flipnet. Nuova mappa dei docenti capovolti. https://flipnet.it/nuova-mappa/ (ver. 15.07.2019).

Flipped Learning Network (2014). *The Four Pillars of F-L-I-P*. http://flippedlearning.org/wp-content/uploads/2016/07/FLIP_handout_FNL_Web.pdf (ver. 15.07.2019).

George, D., & Mallery, P. (2002). *SPSS for windows step by step: A simple guide and reference*, 11.0 Update (4th ed.). Boston: Allyn & Bacon.

Gliem, J.A., & Gliem, R.R. (2003). Calculating, interpreting, and reporting Cronbach's Alpha reliability coefficient for Likert-type scales. Paper presented at the Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education 2013, Columbus, OH. https://scholarworks.iupui.edu/handle/1805/344(ver. 15.07.2019).

Hamdan, N., McKnight, P., & McKnight, K. (2013). *A review of flipped learning*. London: Pearson. http://flippedlearning.org/wp-content/uploads/2016/07/LitReview_FlippedLearning.pdf (ver. 15.07.2019).

Kahn, S. (2011). *Usiamo i video per reinventare l'educazione*. https://www.ted.com/talks/salman_khan_let_s_use_video_to_reinvent_education?language=it (ver. 15.07.2019).

Kurt, G. (2017). Implementing the flipped classroom in teacher education: evidence from Turkey. *Educational Technology & Society*, *20*(1), 211–221. http://www.ifets.info/journals/20_1/19.pdf (ver. 15.07.2019).

Lage, M.J., Platt, G.J., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *The Journal of Economic Education*, *31*(1), 30–43. https://doi.org/10.1080/00220480009596759 (ver. 15.07.2019).

Longo, L. (2016). *Insegnare con la flipped classroom. Stili di apprendimento e «classe capovolta*. Brescia: La Scuola.

Love, B., Hodge, A., Grandgenett, N., & Swift, A.W. (2014). Student learning and perceptions in a flipped linear algebra course. *International Journal of Mathematical Education in Science and Technology*, *45*(3), 317–324. https://doi.org/10.1080/0020739X.2013.822582 (ver. 15.07.2019).

Maglioni, M. (2018). *Capovolgiamo la scuola. Le cinque leve Flipnet per un nuovo sistema educativo*. Trento: Erickson.

Mazur, E., & Hilborn, R.C. (1997). *Peer instruction: a user's Manual. Series in educational innovation*. Upper Saddle River, NJ: Prentice Hall.

McLaughlin, J.E., Griffin, L.M., Esserman, D.A., Davidson, C.A., Glatt, D.M., Roth, M.T., Gharkholonarehe, N., & Mumper, R.J. (2013). Pharmacy student engagement, performance, and perception in a flipped satellite classroom. *American Journal of Pharmaceutical Education,* *77*(9), 196. https://doi.org/10.5688/ajpe779196 (ver. 15.07.2019).

Miller, G.A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review*, *63*(2), 81–97. http://dx.doi.org/10.1037/h0043158 (ver. 15.07.2019).

Missildine, K., Fountain, R., Summers, L., & Gosselin, K. (2013). Flipping the classroom to improve student performance and satisfaction. *Journal of Nursing Education*, *52*(10), 597–599. https://doi.org/10.3928/01484834-20130919-03 (ver. 15.07.2019).

Parker, J., Maor, D., & Herrington, J. (2013). Authentic online learning: Aligning learner needs, pedagogy and technology. *Issues in Educational Research, 23*(2), 227–241. http://www.iier.org.au/iier23/parker.html (ver. 15.07.2019).

Pintrich, P.R. (2004). A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review, 16*(4), 385–407. https://doi.org/10.1007/s10648-004-0006-x (ver. 15.07.2019).

Raffaghelli, J. (2017). Does Flipped Classroom work? Critical analysis of empirical evidences on its effectiveness for learning. *Form@Re - Open Journal Per La Formazione In Rete, 17*(3), 116–134. http://dx.doi.org/10.13128/formare-21216 (ver. 15.07.2019).

Santiago, R., & Bergmann, J. (2018). *Aprender al revés: Flipped Learning 3.0 y metodologías activas en el aula*. Barcelona: Planeta Paidós

Stone, B.B. (2012). Flip your classroom to increase active learning and student engagement. *Proceedings from 28th Annual Conference on Distance Teaching & Learning,* Madison, Wisconsin, USA.

Tague, J., & Baker G. (2014). Flipping the classroom to address cognitive obstacles. Paper presented at the *2014 ASEE Annual Conference & Exposition*, Indianapolis, IN. https://peer.asee.org/flipping-the-classroom-to-address-cognitive-obstacles (ver. 15.07.2019).

Talbert, R. (2017). *Flipped learning: a guide for higher education faculty*. Sterling, VA: Stylus.

Talbert, R. (2018). *How much research has been done on flipped learning? Annual update for 2018*. Blog. https://rtalbert.org/how-much-research-update-2018/ (ver. 15.07.2019).

Talley, C.P., & Scherer, S. (2013). The enhanced flipped classroom: increasing academic performance with student-recorded lectures and practice testing in a "Flipped" STEM course. *The Journal of Negro Education*, *82*(3), 339–347. https://doi.org/10.7709/jnegroeducation.82.3.0339 (ver. 15.07.2019).

Tucker, B. (2012). The flipped classroom: Online instruction at home frees class time for learning. *Education Next, 12*(1), 82–83. https://educationnext.org/files/ednext_20121_BTucker.pdf (ver. 15.07.2019).

Van Vliet, E.A., Winnips, J.C., & Brouwer, N. (2015). Flipped-class pedagogy enhances student metacognition and collaborative-learning strategies in higher education, but effect does not persist. *CBE Life Sciences Education*, *14*(3), 1–10. https://doi.org/10.1187/cbe.14-09-0141 (ver. 15.07.2019).

Vygotsky, L.S. (1986). *Thought and language.* Cambridge, MA: MIT Press.

Yarbro, J., Arfstrom, K., McKnight, K., & McKnight, P. (2014). *Extension of a review of flipped learning*. https://flippedlearning.org/wp-content/uploads/2016/07/Extension-of-FLipped-Learning-LIt-Review-June-2014.pdf (ver. 15.07.2019).

Zimmerman, B. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice*, *41*(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2 (ver. 15.07.2019).