Flipped Classroom and University: the Tic&DIL Project and Students' Perceptions

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***Abstract*— The paper moving from a pedagogical reflection on innovative methodology for the improvement of teaching in schools and universities, presents the model of Flipped Classroom activated during 2014-2015 at the University of Salento in the experimentation of the E-Learning in the University. The contribute describes the design and framework of the Tic & DIL project and the different levels of assessment focusing on the students perceptions. A subgroup of 175 students of the project was involved in this research. An opinion survey shows that the FC approach had a whole good impact on the students. They describe themselves as more motivated and independent in their learning process while, sometimes, it could produce a sense of loss and a relational distance between teacher and students.**

***Index Terms*—flipped classroom, technologies, university, students perceptions, learning**

I. Introduction

Today schools and universities face challenges and demands more and more articulated that reflect the complexity of the systemic and social model which try to respond, according to the paradigm of constructivism, to new instances from the world of production and the multiple needs of new generations of students.

In the conclusions of the work of Lisbon the European Parliament, in 2000, indicated some ways to renew teaching, considering that transmissive teaching often generate in students demotivation, alienation and disaffection for study [1]. In the Recommendations of 18 December 2006, are set out in a definitive way the eight key competences for European citizenship by defining the concept of competence as "a combination of knowledge, skills and attitudes appropriate to the context [...] those which all individuals need for personal fulfilment and personal development, active citizenship, social inclusion and employment". Teachers are asked to promote students learning through experience and through induction processes, whether by encouragement for knowledge representation.

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According to many studies Italian university students (18-22) have to be structurally considered as digital natives [2]. Considering that, in order to effectively offer students opportunities useful to build the expertise it is necessary to provide tools, techniques and strategies centred on competence. Alongside the lessons it is necessary to provide discussions, group work, case studies, solutions of problems of experience, taking of decisions, realization of meaningful tasks, because the learning motivation is the result of two conditions: perceive to be able to tackle the task and feel that the effort required has a value and meaning [3].

This structure often is combined with a little time in the classroom with limited or the limit of credits assigned to the discipline, but can be found in digital technology a valuable ally.

A lot is known about the phenomenology of technological innovation [4], and as stated by Cuban [5] Oppenheimer [6] and Ranieri [7], recurrent mythologies exist and they are followed by failures and advent of new waves. The positive relationship between technology and learning is not obvious, in fact, often it is found that the use of new technologies in school is not in itself effective; consequently are the methods and not the technology itself that make a difference in learning outcomes [8], [9], however, among the technologies the main benefit is presented in the use of interactive video [10].

II. The Flipped Classroom Approach

Recent education research is focused on how teachers can improve their didactics and use the class-time more efficiently than the traditional lesson. A way to create a didactic more interesting through the use of technology is the flipped classroom or flipped learning. In 2000, the flipped approach was introduced by Baker [11] and Lage [12]. Subsequently the Khan Academy popularized this approach through online videos and activities.

In a flipped approach the lesson material is delivered outside the class setting through on line material or video-lessons. Following this approach the students can study the material at home. The class time for students is used to undertake collaborative and interactive activities related to the material they study at home. The flipped classroom structure gives students the opportunity to

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practice in-class what they are learning, which is consistent with the constructive alignment approach recommended by Biggs and Tang [13].

The flipped classroom structure demands active engagement both from the students and teachers. Sam and Bergmann suggest that teachers "flip" their class to utilize the time most effectively. They propose that students, prior to attending class should read a chapter, watch a video or explore a new topic. Then, the teacher may facilitate a discussion based on this information to deepen the students' understanding.

The figure below (Fig. 1) drafted by Center for Research on Learning and Teaching at the University of Michigan contrasts traditional lectures with a flipped classroom

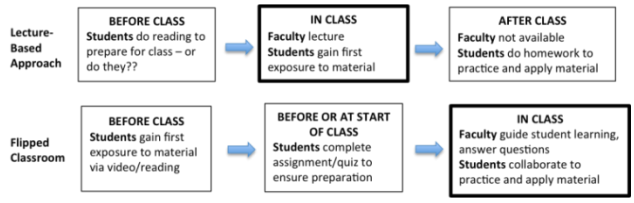

Figure 1. Traditional lectures vs flipped classroom

Looking at the contribution of the cooperative approach teaching methods and teaching laboratory are those that literature and best practices attest as functional and productive. An educational structure able to recover time and experiential workshop classroom to dedicate it to the activation of cooperative tasks, peer learning, workshops and educational problems, is given by the Flipped classroom (class upside down). By inversion of the class it is that the explanation teaching, or part of it, is done at home through materials prepared by the teacher, usually video lessons and part laboratory, and procedural, takes place in the classroom with the teacher who will build, with the class declarative knowledge. The time gained by canonical explanation is invested in interactive between students and between students and teacher who, in this structure, use its expertise to build the real learning process with the student, inverting, he also his role as a transmitter content to broker meanings.

III. The Project Tic & DIL

The project Tic & DIL: Information Technology and Communication and Teaching of Reading, has been developed by the working group of the Center for Research on New Technologies for Inclusion at the Department of History, Society and Human Studies University of Salento within a PON project (National Operational Programme projects funded by European Union) for the design and development of e-Learning experiences. The flipped classroom approach used in this study was undertaken in Semester 2 (February-June 2015). The project aimed to develop a learning environment/workshop for students of the undergraduate and graduate program of the Faculty of Education.

The course was organized in two interdisciplinary thematic unit (ITU) implemented according to the flipped classroom model. Common theme of the two ITU was: LANGUAGES and READING, ie insights and workshops aimed to promoting in the university context interdisciplinary links about learning languages mediated by technology of dyslexic student (Fig. 2). The ITU bound bachelor students has involved teaching and teachers of literary theories and methods of education and teaching methods Laboratory. The ITU intended for students of degree involved teachings and teachers of the Laboratory of educational planning and of theory and techniques of observation of behaviour in education.

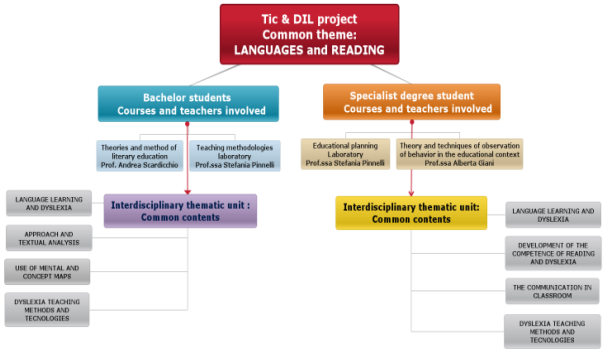

Figure 2. Map of developed teaching units

The online learning has been divided into multimedia and thematic lectures designed with an hypertextual logic with videos and simulations in order to encourage the interaction among students.

For the construction of educational activities the students have been used proprietary and open source software (Camtasia, eXeLearning, Edpuzzle, Storyline, Xerte, Prezi) that have allowed to reuse video assets available on major web portals. The project and teaching activities have lasted 5 months (February-June 2015) and were designed to recognize and evaluate: The learning outcomes achieved by students in both groups (see the experimental model); The effectiveness of the FC teaching model; The critical elements about technological choices adopted

IV. Experimental Design

The project was implemented through the use of the Moodle platform of the University (http://formazioneonline.unisalento.it/).

A. Sample

The investigation involved a total of 380 students. The experimental design included a control group and an experimental group: EG (Experimental Group), including those who have voluntarily entered to the experimental model (260 between graduate and undergraduate students); CG (Control Group 120 students), those who have chosen to follow the traditional teaching model.

Inside the EG there was activated a second level of testing. A portion of the EG (25 students), followed a blended learning, so that for some activities, the contents that would have been the subject of subsequent lessons were anticipated with handouts or videos online.

B. Program and Time

The two groups attended a similar program in terms of content from March until late April, based on a traditional teaching (lectures) and workshop activities in the classroom. The EG has used the Moodle platform in order to support teaching (access to learning materials used in class, handouts and maps of synthesis) and in support of the interaction (personal messages and group activities for the survey data with questionnaires; intermediate deliveries of papers and projects). The CG has been able to acquire the documentation materials through online message boards of the teachers. Every student (CG and EG) prepared a learning unit (project work) online and after they were discussed in the classroom.

From the last week of April, the CG continued its activities for another two weeks as usual.

The EG stopped the face to face lessons in late April and enjoyed the UTI online in the first week of May; in the second week of May these activities have been taken up in the classroom with workshop experiences.

This structure has allowed to transform the classroom into a research community in which students, guided by the teacher have been involved in a discovery learning, for research, and themselves become content creators [14].

In the third week of May all (CG and EG), the students were evaluated. Each ITU provided three video lessons created with the software Camtasia; two hypertext lessons made with the software Exelearning, and some concept maps created with the software Cmap.

V. Monitoring and Evaluation

The project articulates its assessment on three levels: assessment of learning outcomes, assessment of the two methods (blended and flipped), evaluation of the process.

A. Level 1

During the lessons, the two groups EG and GC were urged to produce deliveries, i.e. construction of some elaborates, plans, maps, etc. As regard the tools SW Camtasia, eXeLearning, Cmaps tools, Mindomo, Freemind, have been used.

Although both groups prepared good quality products the exchange of e-mail and communication with the EG students in the presence have been much higher.

Regardless from participation in the experimental model, students who participated in the pedagogical area workshops have taken part in a teaching laboratory.

The workshop setting, in fact, was the first gateway for direct passage from teaching (ITU) to design (workshop). Through a selection of technological resources and instructional strategies experimented in the field, it has allowed the students to try their hand with open applications, interactive whiteboard and intervention models for language teaching for dyslexic students.

This environment has been a tool that has produced several design ideas for teaching and for technologies to support people with dyslexia.

The student, following a bottom-up process, has been called upon to produces ideas in a design format that launched it to a process of shared and collaborative planning.

Specifically, the students during the workshop activities have responded to the educational delivers by the teachers on the topics: after the study of the planned materials (theoretical contents and explanation of the use of technological tools), they have produced the papers: concept and cognitive maps, audio books, video tutorials with the interactive multimedia whiteboard etc.

B. Level 2

At the end of the path the final evaluation on learning outcomes for both groups started. The students responded to the multiple-choice questions exam.

The CG for the program presented in class, the EG for the program delivered until late April and on the ITU.

It has compared: in the Traditional Learning there were delivered face to face training and workshops; in the Blended learning there were delivered face to face training and workshops integrated with educational materials at distance; In the Flipped learning (E-learning mode with video-lessons and face to face workshops).

C. Level 3

Evaluation of the experience of teaching according to the FC and Blended Learning approach. Tools: Evaluation questionnaire on the experience flipped (QFC Pinnelli-Fiorucci) and on the approach to the study Questionnaire (QAS) [15].

This level settled out the results in terms of strategies to approach the study of a sample of 129 university students. The purpose was to investigate in which terms digital learning involves the acquisition of basic skills that affect metacognitive competences.

In this contribute it will be presented the data analysis of level two in the following paragraph.

VI. University Students' Perceptions

There is an extensive literature on the attitudes and perceptions of students about the use of video lessons in education [16] - [18], [9], [19], while a scientific debate about FC approach is lacking.

Bishop and Verleger [20], indeed, have examined 24 empirical studies on this issue highlighting that a strong methodological and content heterogeneity often are not supported by empirical data.

In contrast, however, in recent years on the web it is observed a proliferation of blogs, websites and videos aimed at the promotion and sharing of FC teaching.

TABLE I. Assessment Areas Explored by QFC

Assessment questionnaire on the flipped learning experience (QFC) (Pinnelli & Fiorucci)	
I AREA: Socio-demographic data of the students	Items:1-7, 21
II AREA: Perception of the learning experience with FC	Items 8-15, 23
III AREA: Technology assessment	Items: 16-20, 22
IV AREA: Self-assessment of the cognitive component of the process of access to knowledge	Items: 24-28
V AREA: Self-assessment of the organizational management of access to knowledge	Items 29, 30, 33, 34
VI AREA: Self-assessment of the social and motivational component	Items 31, 32, 35, 36, 37, 38

A. Methodology and Research Tools

The Tic&DIL project included several phases of monitoring and evaluation of learning and methodology, but this paper will report data related to the research on the students' perceptions who participated voluntarily in the experimental FC model.

The research group has drawn up and administered an Assessment Questionnaire on the flipped experience (QFC), a semi-structured questionnaire that consists of 40 items divided into 6 areas (Table I). The questionnaire also included two open items (39, 40) aimed at giving students the opportunity to give voice to their thoughts and concerns about the approach.

B. The Sample

The questionnaire (anonymous and voluntary) was administered, through google drive, it involved 175 students (age average = 22.9, SD = 5.20). Students' characteristics are shown in figures below (Fig. 3)

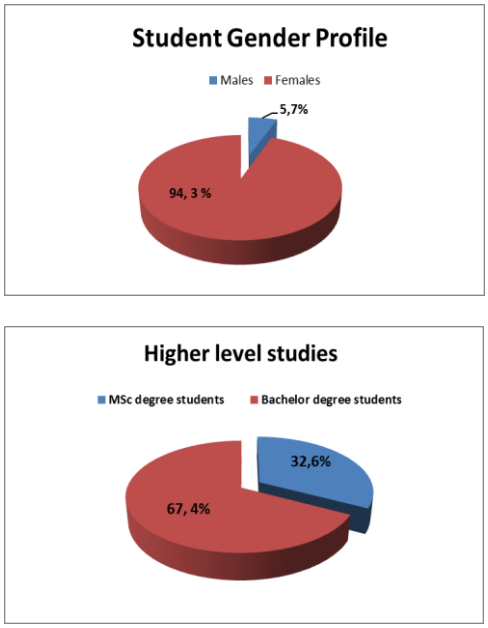

Figure 3. Students' characteristics

The MSc degree students (13.7% in pedagogical area and the remaining 18.9% in psychological area) and the bachelor degree students, all from pedagogical area.

In addition, a high percentage of students has a personal computer and, always a significant number of students, does not know the FC and they did not attend a flipped course (Fig. 4).

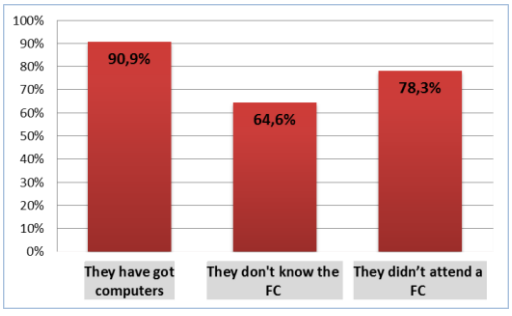

Figure 4. Technologies and FC knowledge

C. Data Analysis

Perception of the experience FC (II area).

The FC approach has received unanimous approval from the students. It responds to different needs, as seen in the figure below (Fig. 5).

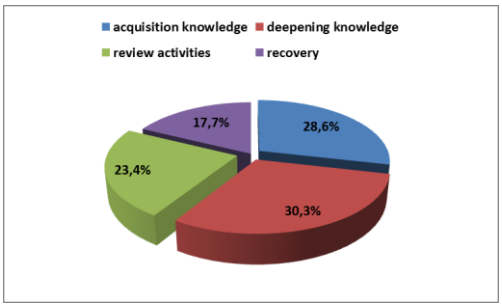

Figure 5. Several purposes of the FC approach

The traditional teaching face to face is more useful for in-depth activities (45.7%).

Teaching online is accessible (89.1%), stimulating (78.3%) and useful (99.4%) and, above all, because it allows students to be able to see several times the video lessons (64%) and, therefore, use the resource time in relation to their learning time.

Technology Assessment (III area)

In this area the students could be assigned a score from 1 (min.) to 5 (max) to some aspects on the video lessons.

The averages of the assessments related to clarity (M = 4.2), audio (M = 3.8) and graphics (M = 3.9) indicate optimal use, while the opinions on issues concerning the length (M = 3.1) and the complexity of the content (M = 2.5), although high, demonstrate critical issues.

The video-lessons, indeed, lasted on average of 20 minutes. Altogether students considered the experience useful even though they appreciate combined teaching (FC and traditional) (76%).

Self-assessment of the cognitive component of the process of access to knowledge (IV area)

This area, as well as the following ones, asks students to express their level of agreement/disagreement.

The use of video according to the logic FC makes it easier to understand the classroom topics (70.9%), as knowing the learning contents before supports the comprehension in the classroom (84.6). Getting back to the topics through exercises and insights in presence facilitates and enhances learning (86.3%).

The FC is functional to meet the students learning needs as it makes the teaching more predictable and, therefore, easier to follow (65.7%).

Self-assessment of the organizational component of access to knowledge (V area)

The analysis of this area shows that the FC approach allows students to manage and organize with more autonomy space and time of learning (83.4%) urging, then, autonomy and customization of the study (74.9%).

Self-assessment of the social and motivational components (VI area).

The area shows critical issues and various states of agreement about the different items that compose it: the FC approach stimulates (45.1% partially agree, 46.9%

agree) and make to feel student responsible (35.4% partially agree, 52.6% agree), while it encourages exchanges between colleagues (44.6% partially agree, 37.1% agree) and decreases the relational distance toward the teacher (40.6% partially agree, 23.4% agree) and it can produce a sense of bewilderment (69.1% disagree).

Strengths and weaknesses about FC experience

The questionnaire also included two open items (39, 40) in which the students could express personal opinions about the strengths and weaknesses (Fig. 6) of the experience. This level settled out the results in terms of strategies to approach the study. The purpose was to investigate in which terms digital learning involves the acquisition of basic skills that affect metacognitive competences.

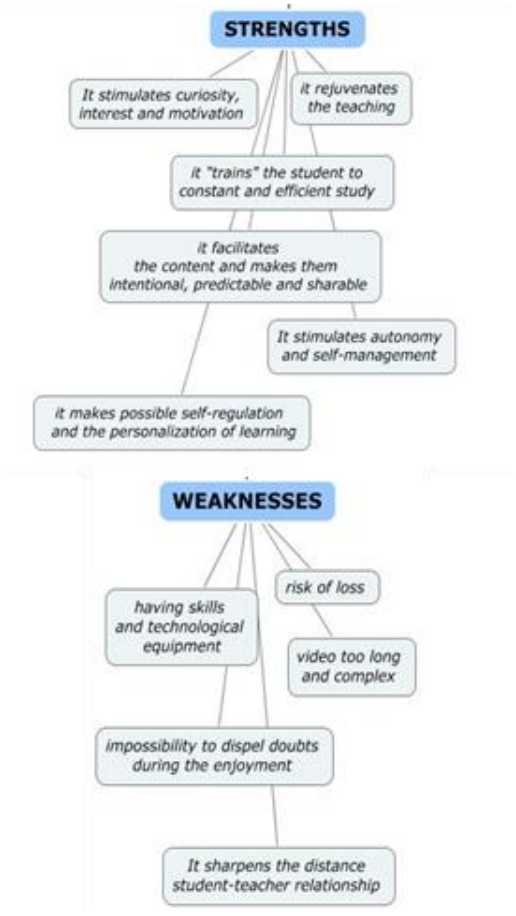

Figure 6. Strengths and weaknesses about FC experience

VII. Conclusion

The strengths that emerged by the open item show that FC approach produces in student's curiosity, interest and motivation becoming a teaching innovation that can rejuvenate the teaching and entire educational model.

Moreover, it trains students for a constant and competent study by accompanying them at every step.

It produces the benefits on the cognitive level, as it helps students in learning by involving them in the production and enjoyment knowledge: it stimulates autonomy and self-management, it makes possible self-regulation and the personalization of learning and it facilitates the content and makes them intentional, predictable and sharable.

Weaknesses emerged belong to different levels.

From the technological point of view it requires, on the part of students, advanced technological knowledge and technological equipment that, often, the university cannot provide.

In relation to the structural level the students complain about the length and complexity of video lessons, although they appreciate the opportunity to review the video several times.

The most critical level is relational one: the FC approach sharpens the distance student-teacher relationship and makes impossibility to dispel doubts during the enjoyment.

The research shows an overall very positive perception of the FC experience.

The students, indeed, see in this approach a "novelty" that can stimulate, motivate them and make them autonomous about the learning management (time, place, tools of enjoyment). In contrast, if the enjoyment of the video-lessons is not followed, at the right time, by the face to face lesson it can induce a sense of loss, isolation, depersonalization and it can accentuate the relational distance among peers and with the teachers.

In addition the research shows that this approach is strongly influenced by: A careful design process and planning activities (in plenary and individual study); an accurate time management; the choice of subjects; the ways and means of teaching contents, educational deliveries and assessments etc; Cognitive-cultural elements and learning and teaching styles, learning environment; technological expertise; the recovery of the emotional and relational aspects.

The FC approach is not a pedagogical model, it doesn't have an epistemology well-defined: it is the result of a multitude of experiments and best practices empirically poorly controlled and comparable to each other, created to satisfy the needs that come from the world of education and aimed recovery pedagogical model learner-centered aimed to customization and sharing of learning (Bloom, Vygotsky or teaching methods as Peer-Assisted, Tutoring, Collaborative and cooperative learning) according to a perspective of optimization of the school time and empowerment the autonomy of the student.

In fact, in recent years in academic and lifelong learning have been launched several experiments aimed at guide the student in the process of acquisition of knowledge and skills of disciplinary knowledge highly codified (mathematics, physics, chemistry, etc.) in which the risk of failure of learning and dropouts is very high.

This autonomy is not only about the approach to the study, but it affects the democratization of knowledge and, therefore, the sphere of student participation in the co-construction and sharing of knowledge.

Despite the FC appears more prevalent in the context of school, the world of higher education promotes more and more experiences of research and teaching that refer to this approach.

In that sense, if in school this approach responds to a need to rationalize and optimize the limited time available, in the academic context, characterized by a high degree of freedom and management (which does not mean autonomy) of time and learning, this approach performs a specular function: return to students, through precise training deliveries, assigned by the teachers, the "weight" and the "sense" of learning time, orienting them, then, to a self and competent managing of it.

Such operation, if in one hand is intended to contain the wasting of resource time and, consequently, to empower students, on the other hand gives them the ability to customize their own learning process according to their educational needs (styles earning, special needs etc) and life needs (business and familiar needs).

As stated by Tucker [21] teachers agree that viewing the recorded videos before class time is not enough to make the flipped model successful. Consequently, it is very important how the teacher creates and manage the didactic and the relationship with the students globally.

In this sense, if the idea is to think of an educational model that is sensitive to the differences of the person in their individual (cognitive and affective), and social dimensions (family environment and the socio-cultural context) [22] this approach can only represent to all a chance and a resource that can enhance and recuperate the pedagogical tradition in a transformative and changing view.

The approach FC, beyond the involvement of innovative tools, must primarily considerate from the whole context of education - Teachers and students - the acceptance of a cultural learning and teaching model that in classroom practice, but especially in the 'minds, ought to be "flipped".

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