Exploring the Universal Design Principles of a Flipped Classroom Model for Inquiry-Based Learning in Cyprus Primary Education Context: A Multiple Case Study

Loizou, Maria

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Declaration

This thesis has not been submitted in support of an application for another degree at this or any other university. It is the result of my own work and includes nothing that is the outcome of work done in collaboration except where specifically indicated. Many of the ideas in this thesis were the product of discussion with my supervisor Dr Lee Kyungmee.

Loizou, Maria

BA Primary School Teaching, University of Cyprus

MA ICT and Education, University of Leeds

Lancaster University, UK

Abstract

Background

In this thesis, a multi-case study will be presented to address an important gap in current literature concerning universal design principles (UDPs) for an effective implementation of a Flipped Classroom (FC) model for Inquiry-Based Learning (IBL), called the IB-FC model. Currently, there has been limited research focusing on the implementation of any FC model within the primary education context despite its potential benefits, such as developing higher order cognitive skills.

Method used

The study is a collaborative research project, during which the research, in collaboration with five primary school teacher participants, explored the effective ways of universal implementation of the initial IB-FC model developed, in five different primary schools in Cyprus. The model was implemented for a school year (2017-18), involving 5 teachers, 77 students and 48 of their parents. Qualitative data has been selected mainly through classroom observations and interviews.

Key results

Data analysis has focused on teachers', students' and parents' experiences and perceptions on the IB-FC implementation which aimed to revise the initial instructional tools, lesson template and framework given to the teachers for designing their lessons. This in turn led to the extraction of seven UDPs: *structure and flexibility, simplicity and accessibility, interconnectivity and*

community, differentiation and personalization, development and progression, motivation and engagement and assessment and evaluation.

Conclusion

The final IB-FC framework proposed in the findings illustrates how the seven UDPs for IB-FC implementation are connected to the ten instructional IB-FC tools developed for further supporting IB-FC implementation. In summary, this study has clearly demonstrated that the FC methodology can be effectively implemented in primary education settings. The final IB-FC framework contributes to the slow growing body of research on FC and IBL practice, theory building and policy in primary education.

Table of Contents

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List of abbreviations

UDP	Universal Design Principle
FC	Flipped Classroom
IBL	Inquiry-Based Learning
IB-FC	Inquiry-based Flipped Classroom
MOEC	Ministry of Education and Culture in Cyprus
CCERE	Cyprus Centre of Educational Research and Evaluation
CPI	Cyprus Pedagogical Institute
TEL	Technology-Enhanced Learning
CS	Case Study
BYOD	Bring Your Own Device
TPD	Teacher Professional Development
ICT	Information and Communication Technologies
NL	Networked Learning
RQ	Research Question
K-12	Kindergarten to grade twelve classrooms
SSCI	Social Science Citation Index
ICO	Interuniversity Centre for Educational Research
FLN	Flipped Learning Network
LMS	Learning Management System
VLE	Virtual Learning Environment
ILAM	Integrated Learning Accelerator Modules
F2F	Face-to-Face
COI	Community of Inquiry

OLRS Online Learning Readiness Scale

HTS Historical Thinking Skills

STEM Science, Technology, Engineering, and Mathematics

SOP² "S": Self-study; "O": online group discussion; "P2": Double-stage Presentations

PS Pilot Student

CSCL Computer Supported Collaborative Learning

DDR Design and Developmental Research

Table of Figures

List of Tables

Chapter 1: Introduction and Background

1.1 Introduction

Over the past decade, education standards have emphasized the value of student-guided learning in which students are responsible of their own learning and they are actively involved in higher-order tasks and cognitive standards (Hannafin, Hill, & Land, 1997; Shea et al., 2012). This requires applying active learning approaches in the classroom which engage students to presenting their work, problem-solving, self and peer assessments, group work and discussions (Zappe, Leicht, Messner, Litzinger, & Lee, 2009).

Yet creating such inquiry-based learning (IBL) environments remains a challenge since teachers are either not trained or lack the confidence needed for applying, orchestrating and tackling the difficulties of these new student-oriented pedagogies (Brush & Saye, 2000; Hannafin et al., 1997). One example is the limited amount of classroom time available for both lecturing of new materials and applying active learning methodologies (Strayer, 2012). Contemporary teaching strategies, which usually utilise technology as the main tool of delivery, aim to ease this tension and allow for effective student-centred strategies.

Flipped classroom (FC) models have attempted to address these issues by allocating more class time for active and student-guided learning and by using advanced technologies to support a blended learning approach. A typical FC methodology offers students access to online video lectures/tutorials (flips) prior to in-class sessions, so that they are prepared to take part in more interactive, collaborative and higher-order activities such as research, debates, problem solving and discussions, i.e. IBL methodology (Bergmann, Overmyer, & Wilie, 2012; Davies, Dean, & Ball, 2013; Fulton, 2012; Hughes, 2012; Lage, Platt, & Treglia, 2000; Talbert, 2012; Zappe et al., 2009).

Students benefit from this pre-class exposure to materials and outside classroom events because they can adjust their learning pace to meet their individual studying style and levels of understanding. During in-class classroom sessions, students have the opportunity to engage with the IBL activities, through group work, instead of passively listening to the teacher (i.e. lecturing). In turn, teachers can spend the in-class time for facilitation, observation of student performance and providing adaptive feedback to individual student or to groups of students (Fulton, 2012; Herreid & Schiller, 2013; Hughes, 2012).

'*The regular and systematic use of interactive technology*' (Strayer, 2012, p. 172) accepts unique FC approaches. However, there are counteracting studies (e.g. Rutherfoord & Rutherfoord, 2000; Tenneson & McGlasson, 2006) which claim that FC models are not new since educators have always used readings, and computer- assisted guidelines to get their learners prepared for the in-class activities.

1.2 Research Problem

FC is '*a pedagogical model in which direct instruction moves from a group learning space to an individual learning space, and the resulting group space is transformed into a dynamic, interactive, learning environment*' (Flipped Learning Network, 2014). The growing research in utilizing FC instructional approach has therefore its grounds on the capability to enrich teaching and learning; to promote better students' learning outcomes (Giannakos, Krogstie & Chrisochoides, 2014) and; to expand learners' experiences and competences (Bergmann & Sams, 2012).

Currently, Technology-Enhanced Learning (TEL) research involving a specific area of FC has focused on higher education with minor exceptions (Hultén & Larsson, 2016; Kim & Chinn, 2011). Moreover, most FC studies have focused on comparing the FC approaches with traditional pedagogical approaches (Herreid & Schiller, 2013; Teo, Tan, Yan, Teo & Yeo, 2014) with a few studies concentrating on students' perceptions on the usefulness and attractiveness of the model. Students' experiences during the three phases of a FC model (i.e. pre-class, in-class and after-class), could effectively inform the design, implementation and evaluation of FC practices and are rarely available, particularly in primary education context (Kim & Chin, 2011). Although it has not been clearly identified or proven, concerns have been raised among primary educators over the age of students and the necessity of well-developed self-regulation skills for the successful implementation of the FC model in primary education settings.

On the other hand, IBL refers to:

> *'The process of posing questions, problems or issues, gathering information, thinking creatively about possibilities, becoming proficient in providing evidence, making decisions, justifying conclusions, and learning the ways of challenging, building upon and improving knowledge of the topic or field of study.'* (Friesen, 2013, p. 154).

IBL therefore encourages students to explore, discover, collaborate, and communicate (Laursen & Kogan, 2014; Stephenson, 2012) by operating multiple perspectives (Short & Harste, 1996). Therefore, it has been reported a rather challenging task to implement effective IBL activities in primary education context (Capaldi, 2015).

Similar to the expected limitations related to the FC model, young students are often perceived as being incapable to complete meaningful IBL activities without direct teacher interventions (Kim & Chin, 2011). This can prove to be challenging especially for low achievers who do not possess a required level of prior knowledge (Flick & Lederman, 2004). Previous researchers also observed negative attitudes towards IBL and worries about their potential failures in their IBL learning processes (e.g. wrong results of experiments, unexpected difficulties etc.) (Magee & Flessner, 2012). Despite these limitations and obstacles, there are a good number of pedagogical benefits of a successful IBL methodology: (a) the development of in-depth understandings; (b) autonomous learning and; (c) critical thinking skills (Çakıroğlu & Öztürk, 2017; Flipped Learning Network, 2014; Mazur, Brown, & Jacobsen, 2015).

Such a positive change, from traditional lecture-based learning to engaging student-centered study, can be made possible by utilizing a FC approach to the IBL design and implementation, i.e. by freeing-up classroom time for more guided IBL activities (Çakıroğlu & M. Öztürk, 2017; Chen & Chang, 2017; Huang & Lin, 2017; Love et al., 2015). Any literature review on FC which is highlighted in Chapter 2, confirms that in primary education the research on such practices is still at a minimum level (e.g. Hultén & Larsson 2016; Kim, 2017). Additionally, the research will draw from the current literature on IBL, a common instructional model in primary education with several limitations when implemented on its own (Capaldi, 2015). Literature on how to combine the models of FC and IBL in primary education in order to maximize their potentials and overcome their limitations is valuable but currently inadequate.

This study, therefore, aims to address these concerns that arise from both FC- and IBL-oriented primary education by exploring the pedagogical possibilities for utilizing a FC model to enhance the quality of IBL design. The research is based on three ideas: (a) the current lack of evidence regarding teachers', students' and parents' positive experiences and perceptions during a FC model implementation in K-12 teaching; (b) the capacity of the FC model, combined with the IBL model, to enhance students' learning experiences (Giannakos, Krogstie, & Chrisochoides, 2014; Rahman, Aris, Mohamed, & Zaid, 2014) and; (c) the current lack of in-depth understandings of how to combine the two models of IBL and FC, and which combination can assist teachers in developing effective instruction in K-12 settings. Thus, a theory-informed instructional model, a 'IB-FC' model (Inquiry-based Flipped Classroom model: a flipped classroom model for inquiry-based learning), is first developed to initiate the exploration. This model has been used to design and develop a number of IB-FC cases, exploiting blended-learning technologies, across five different research sites, i.e. multiple case-studies (CSs): five primary schools in Cyprus.

1.3 Research Background

This research project is largely based on teachers' prior experience in TEL methodologies and in particular in adopting a 1:1 teaching methodology, a prerequisite for IB-FC model implementation. 1:1 initiatives require every teacher and student to have his/her own smart device (e.g. portable laptop, notebook or tablet PC) to work with, both in class and at home (Bocconi, Kampylis, & Punie, 2013). We recognize that 1:1 initiatives might involve the recent trend of Bring Your Own Device (BYOD) initiatives (Tunks, 2012), whereas by '*implementation*' we mean '*the methodological strategy of a technology intervention'* (Rodríquez, Nussbaum, & Dombrovskaia, 2012, p.297) which includes universal principles and practical aspects of teacher participation and training requirements (Penuel, 2006). It therefore also involves Teachers' Professional Development (TPD) opportunities regarding such Information and Communication Technologies (ICT) integration models. TPD has long been perceived as '*a way to effect change in the educational sector'* (Wilson, 2012, p.892). By definition its objective is to develop, implement and share ongoing recent practices and knowledge (Schlager & Fusco, 2003).

It is important to look at the particular context of implementation, *'The Cyprus context'*, and identify current issues concerning all of the above, including ICT integration policies, curriculum content and infrastructure. It is vital to note that primary school teachers in Cyprus teach all subjects of the National Cyprus Curriculum, which do not include a separate subject for '*Computers/ICT skills development'*. This means that a horizontal ICT integration model is promoted, where teachers use technology as an optional part of teaching in every subject. Hence, in cases when break-through initiatives have been implemented in Cyprus (Karagiorgi & Charalambous, 2004), such as the ones discussed below, a critical value to the emerging '*communities of implementation'* (Hadjithoma & Karagiorgi, 2009, p.83) was given to schools. The notion of '*resistance to change*' (Saunders, Bonamy, & Charlier, 2005, p. 48) also has and keeps arises as traditional practice is challenged, highlighting the importance of teachers', students' and parents' experiences and perceptions.

The introduction of ICTs by the Ministry of Education and Culture in Cyprus (MOEC) in primary education was initiated in the early 1990s, through '*Evagoras*', which was an optional ICT integration model (Hadjithoma & Karagiorgi, 2009). No other attempt was systematically pursued until 2011 when the '*One-to-one Kolossi Laptop initiative*' was developed as the first pilot 1:1 initiative in primary education (in which I was the head educator and coordinator). This initiative was researched by the CPI in terms of stakeholders' perceptions and student achievement levels (CPI, 2013). It was then followed by the '*1:1 Kyperounta Surface initiative*' (Kyperounta, P.S., 2019.) and a few BYOD initiatives currently emerging in primary schools, with no prior or ongoing

TPD adopted or any official principles of implementation within the Cyprus context and the National Cyprus Curriculum arising.

Given the lack of academic research on any attempt to a 1:1 teaching methodology in Cyprus, results from national studies on previous attempts of ICT integration into the various subjects in the Cyprus primary educational system (Eteokleous, 2008; Vrasidas, 2015) could give an indication of how the Cyprus educational system works and how teachers work within it. Overall, results indicated inadequate ICT integration on behalf of the teachers in Cyprus, compared to the high-level ICT infrastructure available (e.g. Vrasidas, 2015), similar to those in numerous different other educational settings (e.g. Cuban, 2001; Karagiorgi & Charalambous, 2004). Most of the primary schools in Cyprus are either equipped with a computer lab and/or have tablets which could be used in any lesson, on at least a ratio 1:3 (student: device), with a good internet connection (wired and/or WiFi). The same applies for households, given that almost all students (85%) have a device and a good internet connection at home. Professional factors were identified by Eteokleous (2008) as the inhibiting factor for efficient ICT integration in Cyprus primary schools. These included lack of available universal implementation principles for such initiatives and a lack of pre- and post-service training of teachers and development courses in ICT educational use, also recognized by other international research (e.g. Wilson, 2003). This limits teachers' knowledge in integrating technology into their instruction (Pierson, 2001). Therefore, reform of in-service TPD programs in Cyprus and a need for teacher preparation initiatives prior to any kind of ICT implementation is necessary, including practical tools (such as the IB-FC tools) and theoretical principles for specialized models (Vrasidas, 2015), such as the IB-FC model proposed in this research. Hence, TPD has been necessary within such a research for an effective IB-FC implementation, despite the fact that almost all participant teachers were chosen on the ground of prior ICT educational integration experience.

Recognizing the lack and the importance of academic research in ICT integration models in Cyprus, this research will try to address the gap in providing universal principles in implementing a new model, adopted for the first time in any level of education in Cyprus, the IB-FC model. This will be done through the lens of teachers', students' and parents' experiences and perceptions.

My own prior knowledge and experience as a primary school educator, coordinating 1:1 initiatives, has leveraged my interest and competency in ICT integration models and has assisted me in designing this research, guiding the participant teachers towards effective implementation of the proposed IB-FC model. Since 2011, I was chosen to be the head educator and coordinator of the '*One-to-one Kolossi Laptop initiative'* in Cyprus, given my personal interest, involvement and experience in many international ICT integration models (e.g. Entelis Network https://www.entelis.net/en/home, ATS2020 http://www.ats2020.eu, Demokleos Erasmus+ https://sites.google.com/site/edemokleos/). Also, as a recognized Microsoft Expert Educator since 2010, I was honored with 1st and 2nd placement awards both at the European and Global Microsoft Partners in Learning forums as '*Teacher as Innovator and Change Agent*' (in 2012 and 2014), for acknowledging the role of technology towards the development of the 21st century skills of students. My belief that any well-designed technology-oriented teaching intervention/methodology can lead to improved student achievements was further recognised by the National UNESCO Commission, as I am this year nominated for the '*UNESCO ICT in Education Award'*, given the implementation of the current research. Hence, this research will not only fill a gap in the FC literature but also personally motivate myself as a TEL researcher, a primary school educator and an educational technologist, who is teaching the past four years '*Computers and Educational Technology'* to student-teachers at the European University in Cyprus.

1.4 Research Contribution

In summary, this research aims to fill a gap, identified both within the Cyprus educational context and international scholarly literature on Flipped Classroom, by providing universal design principles (UDPs) that can guide teachers' IB-FC practice across primary education contexts in Cyprus.

1.4.1 Defining universal design principles (UDPs).

Design Principles have varying definitions but they should all have widely applicable laws, guidelines and design considerations, reflecting researchers' and practitioners' accumulated experience and/or knowledge. They are fundamental points of advice for making easy-to-use, well-orchestrated and pleasurable designs as we select, create and organize elements and features in the process of instruction. Hence, design principles in education represent the accumulated wisdom of practitioners/instructors and researchers in creating lesson designs and should inform us of how users will likely react to these designs. They should help educators find ways to improve engagement, influence perceptions positively and attain higher achievement levels.

Design principles are arrived at by adopting various different methodologies (e.g. action research, design-based research, mixed methods) and considering practical contexts but also theoretical frameworks. For example, subject oriented instructional design principles have been empirically validated by numerous studies (e.g. Doabler et al., 2012).

In TEL research, one of the best examples is the Networked Leaning (NL) Principles (McConnell, 1999), which highlights: (a) *Openness in the educational process*; (b) *Self-determined learning*; (c) *A real purpose in the cooperative process*; (d) *A supportive learning environment*; (e) *Collaborative assessment of learning*; and, (f) *Assessment and evaluation of the ongoing learning process*. Although these are considered universal principles of NL, minimum research has been done in primary education which deals with design principles of any technology integration model. Implementation across multiple disciplines in primary education is important for reaching such applicable laws and guidelines. FC research has minimally dealt with FC UDPs, where none exists in primary education context.

1.4.2 Research questions (RQs).

This study aims to answer the following research questions:

RQ1: What are the experiences of teachers, students and parents in different IB-FCs in Cyprus primary school context?

RQ2: What are the overall perceptions of teachers, students and parents on different IB-FCs in Cyprus primary school context (benefits, challenges, limitations of implementing a IB-FC model in different subject matters)?

RQ3: What are the UDPs for an effective implementation of an IB-FC model in Cyprus primary school context across different subject matters?

This study particularly aims to explore and present teachers', students' and parents' experiences and perceptions following the implementation of the IB-FC model proposed in the research. As mentioned previously, the model encompasses the use of technology in adopting a FC model which will free up classroom time for better implementation of an IBL model. The combination of the models can be achieved by adopting and following a particular lesson template developed to assist participant teachers in creating their IB-FC instructions. Different IB-FC tools are provided for guidance through the design. Data collection tools and data analysis will assist in evaluating implementation and presentation of the benefits and challenges of IB-FC. These will contribute in defining UDPs for an effective implementation of IB-FC in primary education. The results in turn will contribute towards the revision of the IB-FC tools provided initially to help teachers develop effective IB-FC learning designs.

In particular, the intervention can help the teaching-learning practice by providing suggestions in how interaction, motivation and engagement can be enhanced through a more structured, but at the same time flexible, FC design. Teacher guidelines in how to maintain that can be given using orchestration routine frameworks and in-flip suggestions. The UDPs developed will also address the need for differentiation and personalisation, recognized in all contemporary teaching models, by providing evidence in how tested FC instructions have worked with primary school students.

The final IB-FC framework, which will be adapted to be in line with such principles and tools, and contributes to the FC and IBL theory building and practice accordingly. It particularly aims to contribute to the empirical research in FC and IBL. It joins a slow growing body of research on the use of FC in primary education. More specifically, this research also hopes to contribute not only to the local research scene on ICT integration models but that of combined FC and IBL literature. To date, there has been little or no research on the use of a FC model in primary education, especially through a combination with IBL, and this study aims to fill this gap. The literature also shows that technology use cannot be pursued without well-defined theory and frameworks (e.g. Neumann, 2016; Wang et al., 2014), especially in primary education (Hultén & Larsson, 2017). Consequently, this study is part of the growing research which explores teaching models which cater for differing learning styles (Bergmann & Sams, 2012), especially through the use of technology (Barak & Asad, 2012; Godzicki et al., 2013; Mayer, 2014) and multimedia (Leutner, 2014).

Pedagogically speaking, an improvement in how IBL skills of students can be developed and progressed in a way which ensures a smooth interconnection of the individual and group learning space will be suggested. The design of instructions which aim towards the development of IBL skills should also go along simple and accessible technology to be used easily, both by the students and the teachers. Therefore, evidently this study will also inform local practitioners who seek to try FC in local classrooms. It aims to contribute to local research in understanding how FC could form part of the curriculum by minimizing design challenges and maximizing the possibility of effective lesson designs. Constraints in infrastructure or TPD can also be overcome by following suggestions within the IB-FC tools developed. Any kind of pedagogical model should also provide interconnection of the learning-teaching time in class and at home. A framework which could go along such a possibility in FC will empower the teachers with a better FC design and better learning outcomes. This will also safeguard a more collaborative environment, given that a good community development in class is indeed an FC prerequisite.

Finally, this study aims to contribute to the area of adopting blended learning methodologies through 1:1 or BYOD programs. With analysis of the UDPs in the effective implementation of a FC approach for IBL in primary education, this study offers many considerations in the incorporation of a blended learning model into a curriculum for young learners, e.g. which assessment and evaluation practices should be adopted, how motivation and engagement can be maximized etc. It also contributes towards avoiding ad hoc, ineffective technology-integration attempts, such as the ones adopted by MOEC for years now (e.g. Eteokleous, 2008; Vrasidas, 2015).

1.5 Overview of the Thesis

Following the introduction of this thesis, the research is divided into six more chapters. The four main areas of the literature review in Chapter 2 examines past research pertinent to this study. It first provides a definition and an overview of the FC learning process, the technology tools used and the values and challenges this model pertains. The second part reports on key literature on FC at various levels of education in an attempt to locate the benefit and the gap for adopting such a methodology in primary education. A critical content analysis is attempted, looking at frequently employed methodologies, area of studies, technology tools, impacts and benefits to students' learning, and challenges of flipping the class. In the third part, literature on IBL is used for defining and locating IBL benefits and challenges which rationalize the attempt to combine the two methodologies to overcome the disadvantages of both. In the last part, the combination of the two methodologies is presented via the IB-FC research framework which guides the research design.

In Chapter 3, the research design is explained. The methodological paradigm discussed includes details on the pilot-study, the design of the technology tools, the background of the research site and the participants. Data collection methods and analytical procedures are also described and presented using visuals and theme tables. Ethical concerns and trustworthiness are also discussed within Chapter 3.

In Chapter 4, the research implementation is clarified by providing detailed descriptions of each case study. Five different IB-FC tools, which have been developed to help the teachers in designing their IB-FC lessons, are also discussed. The Teachers' and Parents' Page on Moodle is also presented. Finally, the chapter talks about the educational design of the research, providing details on the steps and tools used by participant teachers for the design of the IB-FC instructions.

Chapter 5 presents the findings of the research. It particularly addresses the first two RQs. Themes are drawn from the findings and these are triangulated with investigation notes, interview subscriptions, questionnaire responses and reflection notes. Research findings are presented into two main sections: (a) Teacher, student and parent experiences; and, (b) Teacher, student and parent perceptions. These are summarized using tables, figures and Moodle screenshots to back-up the findings.

Chapter 6 discusses the findings presented in Chapter 5 in relation to design considerations and RQ3. It particularly states, explains and discusses in detail the seven UDPs for IB-FC implementation. The discussion is supported by previous research findings and the new and revised IB-FC tools are presented.

Finally, this study closes in Chapter 7 with a summary of findings and the final IB-FC framework proposed by this research, which combines all UDPs and IB-FC tools for an effective implementation of the IB-FC model. Contributions and limitations of the research are discussed as well as directions for future researchers or policy makers to expand further their theoretical considerations needed for undertaking projects and derived publications in the FC or IB-FC approach in the primary education.

Chapter 2: Literature Review

2.1 Introduction

This chapter will be divided into four parts. In the first part, the FC model will be defined and benefits and challenges will be identified. In the second part key literature on methods and FC frameworks in primary, secondary and higher education will be reviewed. In the third part, past research on IBL will be used to describe the corresponding instructional model, the IBL model, together with its benefits and challenges. The link to the FC model will be also explained through relevant literature. In part four, the gaps and challenges identified in the first three sections of the literature review are used to explain the combination of the FC model and the IBL model and the development of the research framework: the IB-FC framework.

In particular, besides the lack of research that examines FC in its pedagogical context, the majority of studies had been conducted in Western higher education sector (see Bishop & Verleger, 2013; Giannakos et al., 2014; O'Flaherty & Phillips, 2015 for a review). Mazur et al. (2015) have emphasized the gap in FC instruction research in kindergarten to grade twelve classrooms (K-12) whereas very few published studies have hitherto focused on the eastern European primary school settings. Besides this gap, students in a flipped class are required to take more responsibility for their own learning such as watching the video lectures before class and participating in group problem-solving activities during in-class lessons, i.e. engage in IBL activities. However, not all students, especially children in primary school, have the ability or skills to deal with such real-life problems in class. IBL can help students develop such skills but lack of classroom time for specialized teacher guidance in traditional teaching models, has limited its application in primary education. Hence, the two methodologies, FC and IBL, could be combined and complement each other as the limitations of each can be overcome by the freed-up classroom time for teacher guidance needed to engage in IBL activities.

The gap in UDPs of a FC approach is therefore running bigger with the need to combine the two models and attempt implementation in a primary school setting. These gaps will be explained in detail throughout the literature review as well as the framework developed which guided the lesson designs of this research. This study will therefore offer the UDPs needed to close the gap in FC implementation in primary education, through its combination with IBL and a close study on the experiences and perceptions of teachers, students and parents involved.

2.2 Flipped Classroom (FC)

In review of the FC model, a four-phase methodology was carried out (Cooper, 1989): reporting of the channels followed, the rational of source choice, years covered and key words used for the search. Key literature on the FC model was collected through a systematic electronic search of academic and online libraries (e.g. Lancaster University's OneSearch, Google Scholar) and databases (e.g. ScienceDirect, SpringlerLink, Tailor & Francis Online, ERIC, PICARTA, DARE-net, ISED, Web of Science, Academic Search Complete, British Education Index, the Social Sciences Citation index (SSCI) and PsychINFO). These databases are well known and considered adequate for research in social studies. The keywords used during the search included: *flipped classroom, flipped learning, inverted classroom, flipped model, flipped education,* and *flipped classroom approach*. All keywords were indexed in both singular and plural forms, combined with '*elementary and primary education' or 'K-12'*. Only contemporary studies conducted between 2000 and 2018 were selected and only referred journals which were indexed and registered by the SSCI or by the Interuniversity Centre for Educational Research (ICO), were considered proper outlets for the articles.

During the second phase of the search process, the abstract, summary and references of chosen resources were scanned. Eight new key words turned out to be relevant: *individual learning space, group learning space, flips, entrance ticket, post-class phase, Bloom's taxonomy, student engagement and interaction.* All databases of phase one were used again for searching these terms. The first and second phase of the search process was therefore repeated.

Next, all selected sources were read in depth and the final journals, books and other sources analyzed were chosen on the following rationales:

- A specific focus on the FC model, in any educational level (primary, secondary, higher).
- Any field of studies in the FC model, especially in the design and implementation of the model, in any subject matter across any educational level.
- All technology integration models in line with the implementation of the FC model in education.

The journals which did not meet the above criteria were not considered, especially if they did not define clearly the FC model methodology and the theory behind its implementation within any educational scenario. Moreover, key books which dealt with more practical issues on the implementation of the FC model have been used, e.g. '*Flip your classroom: Reach every student, in every class every day'* (Bergmann & Sams, 2012); '*Flipped Learning for Elementary Instruction'* (Begmann & Sams, 2015). In total, a number of 71 articles, 8 books, 2 book chapters, 7 conference papers, 6 reports, 2 dissertations and 3 more relevant online posts were selected.

In the fourth final phase, the sources selected were categorized by: (a) authors names and year of publication; (b) type of document; (c) location of the university of the first author; (4) type of research (conceptual versus empirical); (5) type of education, and; (6) the main findings of the theoretical search (see Appendix 1). Subsequently, the main findings for this section and the next were grouped into 3 covering main themes: (a) Defining flipped classroom; (b) Benefits and challenges; and, (c) Key literature: flipped classroom in primary, secondary and higher education. The definition of the flipped classroom is divided into the FC learning process and the technology tools used. Benefits are about student achievement, motivation, engagement and interaction, whereas challenges are also recorded. Key literature has been divided according to the methodology adopted and the level of education.

2.2.1 Defining flipped classroom.

The FC learning process

In recent years, the FC teaching approach has become one of emerging technologies in education aimed to foster students' active learning in higher education (Hamdan, McKnight, McKnight, & Arfstrom, 2013). It is cited in the literature as an innovative learning approach to teaching and learning, where students watch a video tutorial outside the class via distance learning and then engage in hands-on activities within the class (e.g. Baker, 2000; Bergmann & Sams, 2012; Young, Hughes, Inzko, Oberdick, & Smail, 2011). Hence, the approach exploits the latest instructional technologies, such as video recording technologies (Bergmann & Sams, 2012) in which traditional lecture material is transferred outside the classroom in the form of flip/flips (in alternative formats, mainly video-tutorials and/or readings, screencasts), thus allowing class time to be used for IBL (Bergmann & Sams, 2015; Love et al., 2015; Ullman, 2013) and can be targeted to individual and group learners' needs (DeLozier & Rhodes, 2016).

Flipped learning can be defined as a combination of direct instruction and constructivism, primarily based on the student-centered ideas of John Dewey (Jensen, Kummer, & Godoy, 2015). The concept of flipped learning was pioneered as the '*classroom flip*' (Baker, 2000, p. 9) whereas later studies referred to it as '*the inverted classroom*' (Gannod, Burge, & Helmick, 2008, p.777; Lage et al., 2000, p.30), reversing the classroom (Foertsch, Moses, Strikwerda, & Litzkow, 2002), and the flipped classroom (Bergmann and Sams, 2012). Halili and Zainuddin (2015) noted that the FC is an element of blended learning (Heilesen, 2010; Poon, 2014), integrating both face-to-face learning in the class and distance learning outside the class, by watching asynchronous video lessons and engaging into online collaboration.

In this study, as stated above, the definition of FC provided by the Flipped Learning Network (FLN) (2014) will be used:

> '*A pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive, learning environment where the educator guides the students as they apply concepts and engage creatively in the subject matter.'* (p. 1)

Successful methods documented in the literature (mostly available for secondary and higher education) differentiate between time in (group learning space) and out of class (individual learning space). In-class activities range from knowledge building, to collaborative discussion, small group tutoring, hands-on and problem-solving projects/activities, skill practice, lab activities, speeches, conversation, exploring real problems, peer reviewing etc. (Bergmann & Sams, 2008, 2012; Hamdam, McKnight, McKnight, & Arfstrom, 2013; Project Tomorrow, 2013; Toto & Nguyen, 2009; Ullman, 2013). Homework assignments and peer interaction sessions for the promotion of differentiated instruction, personalized and high-order learning are part of in-class session (Yarbro, Arfstrom, McKnight, & McKnight, 2014). However, since in-class activities can vary from one to another widely, it is unclear in the literature which and how FC can assist learners develop critical thinking skills effectively (Bergmann & Sams, 2008; O'Flaherty & Phillips, 2015; Rahimi, Van den Berg, & Veen, 2015).

Out of class activities concentrate on videos, presentations, forum-use, note taking tools and preparatory procedures, e.g. entrance tickets (Hultén & Larsson, 2016). Students benefit from early exposure to the material, provided they are not overwhelmed by pre-class material (Capaldi, 2015). The development of technologies and multimedia (i.e. e-books, cloud computing services, mobile devices) has provided an opportunity to achieve the goals of a FC model (Hwang, Lai, & Wang, 2015; Kong & Song, 2015). Via cloud computing services, students' learning logs can be recorded and analyzed, and hence learning support can be provided (Hwang et al., 2015; Sandberg, Maris, & Hoogendoorn, 2014).

Technology tools

Diverse technology tools have been used in FC research together with online learning platforms. The video tutorials, a basic form of a flip, are usually made by the educators with narration, text and enriched with various annotations and images, e.g. Love, Hodge, Grandgenett, and Swift (2014) have used LaTex beamer package; Davies et al. (2013) have used MyITLab videos and McLaughlin et el. (2013) Echo369 Classroom Capture. Widely accessible tools, such as iTunes and YouTube are employed for the creation and sharing of the videos (Kotlik, 2014). The Khan Academy has also created a digital video library for K-12 students by extending the type of ready-made online resources available for flipped learning (Hao, 2016). Other tools for sharing the flips (text, picture or videos) are also used to facilitate distance learning, such as blogs (e.g. Roach, 2014), wikis, Learning Management Systems (LMSs) or Virtual Learning Environments (VLEs), online platforms (e.g. Baker, 2000; Pempek, Yermolayeva, & Calvert, 2009) and Blackboard Journal page (Talley & Scherer, 2013). Hung (2015) has used WebQuests for promoting active learning whereas Kim, Kim, Khera, and Getman (2014) and Kong (2014) enhanced collaboration through Google Docs and Google Hangouts, after watching video lectures on Youtube. Other online software such as T1-89 graphing calculator (McGivney-Burelle & Xue, 2013) and interactive television (Missildine, Fountain, Summers, & Gosselin, 2013) have been used.

Many of these studies have added to the list of essential digital tools for FC implementation, especially the ones which showcase how flips can be developed. However, most of them have not indicated how can these be used for younger students, focusing mainly only in secondary or higher education. For example, how can the structure of a VLE be simplified or how can administration of Google Docs or Hangouts be more suitable for young ages are scarcely explained. Moreover, digital video libraries (e.g. Khan academy) are useful for English-speaking students only. This means that teachers' choice for ready-made flips is very limited for delivering content in another language.

2.2.2 Benefits and challenges of FC.

Benefits

Several studies have shown that the FC approach has positive impacts and benefits for the students, especially in relation to students' achievement, engagement, motivation and interaction.

(i) Students' achievement:

Bloom's revised taxonomy of cognitive domain has been the base of the study of FC. The taxonomy has six levels of learning (see Figure 2.1), from lowest to the highest level:

1. Remembering: students try to understand basic principles and new concepts by recognizing and recalling information.

2. Understanding: students show how they comprehend and interpret the information and summarize their learning.

3. Applying: students apply and practice the new knowledge to actual situations.

4. Analyzing: students use critical thinking in problem solving situations, use discussion and comparison, producing creative thinking to obtain new knowledge and ideas.

5. Evaluating: students go through self and peer assessment, evaluating the whole learning concepts using success criteria and making sufficient judgments.

6. Creating: students are being creative through the design, construction and production of new forms of content they have learned (Bloom, 1969).

During a FC instruction, the aim is for students to practice lowest levels of cognitive domain (remembering and understanding) away from the classroom, while focusing on higher orders of cognitive work (applying, analyzing, evaluating, and creating) in the classroom (Krathwohl & Anderson, 2010), as illustrated in Figure 2.1, given by Zainuddin and Halili (2016).

As mentioned in the definitions above, out of class activities in the FC model allow for the lower levels of cognitive domain, supported through the recorded lectures, videos, readings, simulations, and other materials. In-class time will thus focus on how to support the learners in achieving a higher level of the taxonomy domain (Lankford, 2013; Nederveld & Berge, 2015). Figure 2.2

includes a screenshot of a table given by Zainuddin and Halili (2016), illustrating the comparison of a traditional vs a flipped learning methodology.

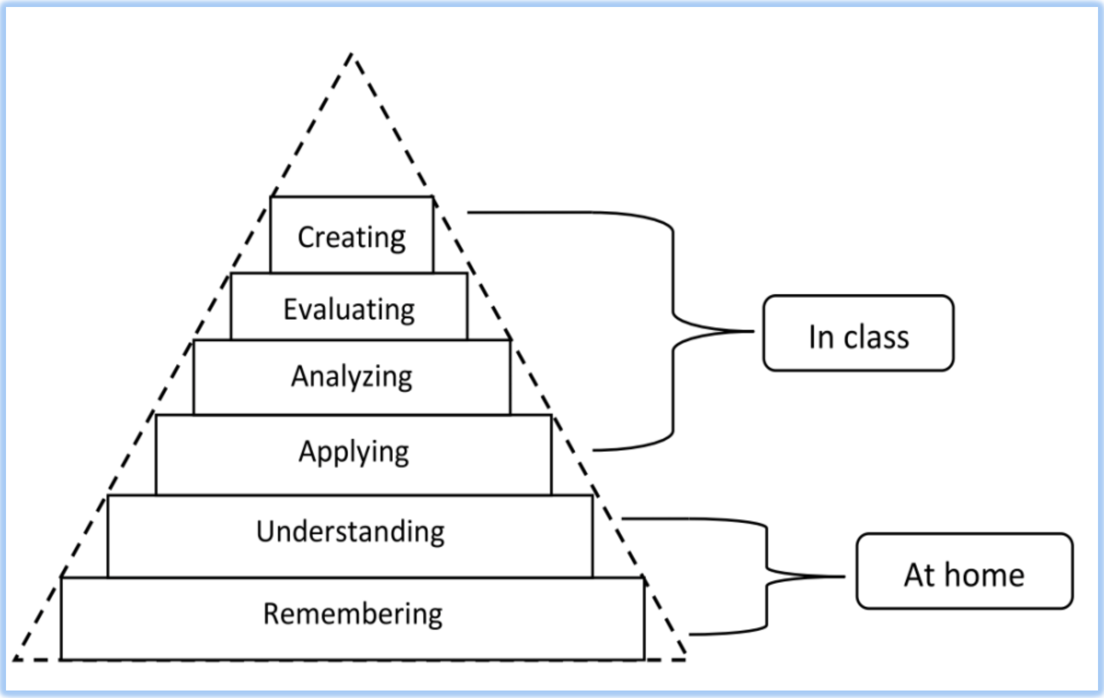


Figure 2.1. *Bloom's revised taxonomy in flipped classroom, Zainuddin & Halili, 2016, p. 316*

Level of learning	Traditional classroom tools	Flipped classroom tools
Remembering	Face-to-face lecture	Pre-recorded lecture, reading material, and watching video lectures independently
Understanding	Question and Answer	Reflection, peer-to-peer discussion and collaboration
Analyzing	Homework	Classroom activities such as a group discussion
Applying, Evaluating, Creating	Homework or nothing	Student projects, presentations, peer-evaluation and instructor-evaluation.

Figure 2.2. *Comparison between traditional classroom and flipped classroom in achieving higher order thinking of Bloom's Taxonomy, Zainuddin and Halili, 2016, p. 316*

Some researchers have implemented the FC model to examine the impact on students' achievement, showing that it can effectively support an improvement with several motives (Galway, Corbett, Takaro, Tairyan, & Frank, 2014). Davies et al. (2013) have particularly looked in how the use of technology can have an effect on student achievement levels given the use of the FC model. Their results have shown that the use of technology had been effective and scalable. They compared pre-test and post-test scores to verify the improvement, a common methodology adopted by other studies as well as (Enfield, 2013; Galway et al., 2014; Kong, 2014; Talley & Scherer, 2013). Therefore, students have indeed shown that they can understand learning content and achieve high orders of cognitive work through FC methodology, i.e. higher score in the port test or exam given. For example, Talley and Scherer (2013) talked about improved average course grades of the students when those have been compared to a previous semester without flipping. They reported how the academic performance in a flipped STEM course was increased through student-recorded lectures and other FC practices. McLaughlin et al. (2014), in their research on pharmacy student engagement, performance and perception in a flipped satellite classroom, measured students' exam performance and added to the argument for improvement in the achievement levels through FC methodology.

Several other studies focused on the comparison of FC to traditional classroom settings, showing significantly better outcomes than in the conventional group or control class (Baepler, Walker, & Driessen, 2014). They have also shown an improvement in the students' perceptions of the learning environment. A study by Hung (2015) verified that the structured and semi-structured flip lessons were more effective instructional designs than the non-flip lessons (flip > semi-flip >, flip > non-flip, $p < 0,05$) in teaching the English language. The investment on faculty time and effort for flipping a calculus class was also beneficial according to McGivney- Burelle and Xue (2013). Formative assessment, as the instructor acts as a facilitator to motivate, provides guidance and feedback to students periodically (Bergmann & Sams, 2012; Deslauriers, Schelew & Wieman, 2011; Strayer, 2012) is another reason for improved learning outcomes. Students understand what is required since the instructor evaluates and gives feedback throughout the whole learning process (pre-class, in-class, after-class), overcoming deficiencies in learning (Kim et al., 2014).

Tune et al. (2013) also highlighted how students' performance was improved, especially evident in the assessment practices by using a quiz and a class meeting to imitate the FC environment. Missildine et al (2013) have equivalently talked about students' improved performance through research in a FC nursing course.

Additionally, the research by McGivney-Burelle and Xue (2013) reported that the students' ability to pause and re-watch the videos at any time affected their learning positively and allowed them to improve on the skill of note-taking whilst watching the flip as well. Similarly, other published research studies, such as Bergmann and Sams' (2008) case study in two high school chemistry classes, indicated that FC instruction is appreciated by students since they are able to pause, rewind flips and work independently at their own pace/speed, enjoying individualized attention from the instructor when struggling to understand concepts/new content. Beyond students' perceptions, Kong (2015) highlighted the increase in students' critical thinking abilities and their creativities (Al-Zahrani, 2015). Both researchers having integrated the FC model into an e-learning course. Basically, the video lectures should be highly related to classroom time and trigger student's interest for the in-class activities which will follow (Gaughan, 2014). During classroom face-to-face time, sessions are used for discussions and analysis of the previously watched flip, and other student-engaging tasks, such as further primary and secondary sources analysis, debates, self and peer reviewing processes or simulations (Bergmann & Sams, 2012).

FC is also an ideal learning space for differentiation (Bergmann & Sams, 2012), normally associated with student success (Tomlinson & Moon, 2013). Empowerment through differentiation can improve self-motivation (Wormeli, 2006) and self-efficacy (Kim et al., 2014), especially through the use of technology (Barak & Asad, 2012; Godzicki et al., 2013; Mayer, 2014) and multimedia (Leutner, 2014).

(ii) Students' motivation:

Motivation plays also an important role in implementing FC at any setting, being a crucial element which supports performance and achievement (Cole, Field & Harris 2004). Both intrinsic and extrinsic motivation (Abeysekera & Dawson, 2015) have been highly valued in many flipped learning studies (e.g. McLaughlin et al., 2013), empowering students to develop the ability to learn independently at their own pace. Davies et al. (2013) have noted that students undertake substantial out-of-class work, based on tutorials and simulations, which promotes motivation and self-paced learning. The increase in self-efficacy in independent learning was mentioned by Galway et al. (2014) and Enfield (2013). ILAMs (Integrated Learning Accelerator Modules) and LMSs used by McLaughlin et al. (2014) have also illustrated improved students' autonomy and competence, hence elevated intrinsic motivation. A research by Kim et al. (2014) also proved, through the collection of the experiences of three FCs in an urban university, how the success of a FC model is based on students' pre-class work as a main principle of implementation.

Furthermore, FC is recognized in the literature as a student-centered approach to learning where the students are more actively engaged than the instructor. Studies have indicated that learner autonomy, performance, and motivation can be maintained and enhanced through such student-centered instruction (Smit, de Brabander, & Martens, 2014) as it can move the traditional lecturer's talk to video and the students can listen to the '*lectures*' anywhere outside of class:

> '*The flipped classroom allows students to watch the video according to their preferred time and need, and they can study at their own pace; this type of activity also increases students' collaborative learning in distance education outside the class'* (Zainuddin & Halili, 2016, p. 315).

Students' needs for autonomy, competence and relatedness are likely to be satisfied by a FC environment, as McGivney-Burelle and Xue (2013) have noted. They have in fact investigated how intrinsic motivation can be enhanced and affect further learning through such learning opportunities. Enfield (2013) has also worked through how FC can improve students' self-efficacy in independent learning.

Enhancing motivation can be a result of FC implementation but also the reverse is substantial. Motivation should be enhanced in the first place in order for the students to be able to react positively to the new model of self-regulation learning at home. All in all, most FC research which dealt in collecting students' experiences and perceptions (e.g. Davies et al., 2013; Enfield, 2013; Kim et al., 2014; McLaughlin et al., 2014) has given emphasis in how students are motivated to learn at their own pace and how they would recommend it to their own friends as well (McGivney-Burelle & Xue, 2013.)

(iii) Students' engagement and interaction:

Since lecturing of new content and content review are outside of class time (e.g. Jungić, Kaur, Mulholland, & Xin, 2015; Mazur et al., 2015; Sohrabi & Iraj, 2016; Wasserman, Quint, Norris, & Carr, 2015), more time is left with the use of FC for active and IBL in class, as illustrated in the Bloom's taxonomy. Students are able to prepare for in-class activities by exploring the given learning material. In the research of Kim et al. (2014) and Talley and Scherer (2013), students felt confident in the class to discuss and participate because of their preparation before coming into the class. Multiple benefits have also been noted in many other FC studies concentrating on deeper content engagement in class, activities with peers, more personalization, supporting student-centered learning, continual and immediate feedback and scaffolding, maximization of class time and authentic learning experiences (Bergman & Sams, 2008; Brunsell & Horejsi, 2013; DeLozier & Rhodes, 2016; Hamdam et al., 2013; Lo & Hew, 2017; Moraros, Islam, Yu, Banow, Schindelka, 2015; Project Tomorrow, 2013). This in contrast with traditional class activities which produce low level of student engagement (Nguyen, 2010), leading to negative habits such as boredom and disruptive behavior (Freeman et al., 2007).

Students and teachers express a positive attitude towards the FC model as it elevates interest and engagement and makes students more responsible in their studies (Bergmann & Sams, 2015; Fielding, 2005; Gaughan, 2014). The social interactions grow through technology and distance learning opportunities outside of the classroom and in the classroom (Wang, 2013), on all three levels of Moore’s technology-based learning: student-content interaction, student-teacher interaction and student-student interaction. Hillman, Willis and Gunawardena (1994) added student-interface interaction, which is also enhanced through technology tools employed. FC instruction helped collaboration (Roach, 2014), enabled students to build a learning community and exchange ideas (Kim et al., 2014) and promoted real-time and virtual dialogue (McLaughlin et al., 2013). Love et al (2014) compared traditional and FC in a mid-sized metropolitan university in an algebra course and positive student perceptions were recorded in terms of interaction and help from peers. Such findings, however, may not translate into K-12 learners since such research has been based mainly on secondary and post-secondary students (McTigue, 2009).

All research agrees that the aim of flipped learning is to establish students' engagement with active learning. Students' desire to participate actively in a routine class activity, e.g. listening to a topic, submitting entrance tickets, collaborating and working with the instructor, has been reported in many FC studies (Delialioglu, 2012; Zepke, Leach, & Butler, 2009; Yang & Cheng, 2014). In particular, Talley and Scherer (2013) research reported that students could confidently produce their own summary of the biological process in their own words by implementing the flipped classroom and they could also be active learners in class. Other researchers, such as Kim et al. (2014) emphasized the importance of students' confidence, i.e. by interacting with asynchronous video lectures outside the classroom, students feel more confident and prepared to participate in classroom discussions. Hung (2015) similarly highlighted that students engage and 'feel part' of the FC learning environment and are themselves engaged in the learning process more than in a traditional classroom setting.

Since FC is a blended learning methodology, the blending of new technology and the traditional classroom can establish students' interactive learning, particularly outside the group learning space (Missildine et al., 2013). This was also emphasized by McLaughlin et al. research (2013) since the students can enrich the dialogue with their friends both at the individual and group learning space because the activity of teaching and learning in a FC setting is not just limited within the classroom. The increase (75 students- 66%) in student-student and student-teacher interactions was formally reported in the study of Hung (2015) in an English Language middle school class.

Challenges

In K-12 research, TEL has had varied success. The ability of '*digital native*' students to deal with technology is not always given and hence research can be misleading (Wang et al., 2014). Motivation in the classroom is overestimated in relation to technology (Housand & Housand, 2012; Koutropoulos, 2011), as it can only occur when '*students experience competency, individualize their learning, and connect to a larger community'* (Jacobs, 2013, p. 271). Therefore, challenges exist, including requisite expertise, time and equipment costs for the creation of instructional material by the teachers (Lage et al., 2000; Yarbro et al., 2014) and access to networked and school technology by students (Ullman, 2013). Designing intellectually engaging FC materials can prove to be very challenging for teachers as they sometimes have to face less-attentive and less self-disciplined students compared to live instruction (Al-Zahrani's, 2015). Instructors need support and guidance to successfully flip a class (Berrett, 2012).

Moreover, surveys also revealed that some educators were not convinced about the effectiveness of technology and improvement of students' grades (Kim et al., 2014), while others expressed worries about the amount of time they had to devote for designing new activities and material and also the technological competence they should attain (Milman, 2012; Townsend, 2010).

Additionally, students may be less keen to take their own notes if everything is provided for them (DeZure, Kaplan, & Deerman, 2001), or may not comprehend the content (Kim et al., 2014; Kuo, Hwang, & Lee, 2012; Mason, Shuman, &

Cook, 2013). A passive learning style also needs to be avoided, noted by Bergmann and Sams (2008), which provided videos which engage the learner and give the choice to pose questions, just like it would work with live lecturing. The design of the video lecture should be attractive to students and motivating in order to be effective and avoid disengagement (Enfield, 2013). Hence, the possibility that FC ends up as an ineffective method needs to be considered by avoiding the exchange of boring face-to face (F2F) lectures with boring recorded lectures (Ash, 2012). Preference of students for a F2F lesson/lecture is also an issue (Chen, Wang, Kinshuk, & Chen, 2014; Toto & Nguyen, 2009) and needs to be studied in the reflect-phase of the research, considering '*homework*' preference of students within a FC model (De Araujo, Otten, & Birisci, 2017). Overall, students' perceptions to a FC model are very important to consider as students may feel helpless and discouraged (Mason, Shuman, & Cook, 2013; McLaughlin et al., 2013). The perceived quality and value of the approach are vital mediators to students' satisfaction (Zhai, Gu, Liu, Liang, & Tsai, 2017). Promoting students' responsibility and control over learning should also be one of the instructor' priorities within such a model (Kovach, 2014).

The FC limitations mentioned prove that the flipped learning approach requires further research into areas such as achievement scores, technology used and mostly how pedagogy is integrated. Hall and DuFrene (2016) pointed out how instructors usually bog down in the technology aspects and neglect instructional design since FC is more about how to best use in-class time and not as such about the quality of the flips.

2.3 Key Literature- Flipped Classroom in Primary, Secondary and Higher Education

Key literature on methods used for the FC studies will be assessed here, together with practices and tested frameworks, in order to locate the gaps, decide on the methodology and theoretical framework of this research. This will be followed with the observation that most of the studies on FC have been performed in higher-education settings and they are either descriptions of how teachers have implemented FC in their classrooms or are studies of the effect of using this method as compared to more traditional approaches (e.g. Herreid & Schiller, 2013; Slomanson, 2014; Teo et al., 2014).

2.3.1 Kinds of methodology.

Lage et al. (2000) have been some of the first who talked about inverting the classroom, focusing on two college economic courses. This was seven years before it was popularized by Bergmann and Sams in 2007, two high school chemistry teachers in Colorado (Halili & Zainuddin, 2015). Looking at current FC research, the mixed method approach (quantitative and qualitative) has been the most widely used methodology, followed by the quantitative approach. Numerous research between 2013-2015, has been analyzed by Zainuddin and Halili (2016), who used multiple instruments (tests, questionnaires, documents, and interviews) to collect vast information on the effective FC practices (e.g., Chen et al., 2014; Roach, 2014; Kong, 2014; Davies et al., 2013; Enfield, 2013; Galway et al., 2014; Hung, 2015; Kim et al., 2014; McGivney-Burelle & Xue, 2013; McLaughlin et al., 2013; Simpson & Richards, 2015; Talley & Scherer, 2013). The same applies for more recent studies (e.g. Bauer-Ramazani, Graney, Marshall, & Sabieh, 2016) who have used experimental methodology for a FC research in higher education discussing second language acquisition. They have incorporated multiple informal assessments and project-based learning for citing FC benefits and challenges. Similarly, the current study will use a mixture of qualitative data for investigating the combination of project-based learning through IBL methodology with the FC approach.

Instructors' perceptions and insights gained in higher education settings were also collected by Hall and DuFrene (2016) through qualitative semi-structured interviews, aiming to identify best practices. These are important insights for the evaluation of teachers' experiences and perceptions which will be pursued in this study, being part of the qualitative data. On the other hand, González-Gómez, Su, Airado, and Canada-Canada (2016) focused mainly on the students, where a statistically significant difference was found on all assessments with the FC students performing better on average. A more integrated research by Horner (2016) employed mixed methods methodology, using both experiential and active learning in a photography class as well as motivational tools which can be used as examples in creating IB-FC tools within the current research. This research not only went beyond Hall and DuFrene (2016) in methodology but it also went through implementation of a FC community, giving examples of effective FC practices to be integrated within the framework.

Comparisons of traditional to flipped classrooms were also effectively made in Kim's (2017) case study, which through a variety of teaching and learning activities, used three factors of analyses: *teacher presence, social presence and cognitive presence (*Community of Inquiry-CoI- instrument)*.* Students' and teachers' perceptions over traditional vs FC experiences were investigated to explore effective flipping strategies which would take students' experiences into consideration. As students share differing learning types, Lage et al. (2000) have taken these into consideration through qualitative research. They particularly provided options to instructors in higher education on how to cater for most learning types through FC methodology while still maintaining control over course coverage and content. However, Marks (2015) argued that with careful curriculum design, both content and methods learning objectives can be taught and mastered with FC methods anyway, something he has proved using a mixed methods research in same educational level settings (i.e. higher). Similarly, in the current study, students' experiences and perceptions should be evaluated, borrowing Lage et al.'s (2000) methodology which is to consider learning types within design and implementation.

Further themes which need to be taken into consideration in a FC setting had been the ones mentioned by Tawfik and Lilly (2015) who qualitatively investigated a FC for a psychological statistics course at university level: *relevance, reciprocal learning, teacher as facilitator and self-efficacy* (problem-based learning, self-directed learning and multimedia). Although their work is valuable in framing FC designs, they themselves proposed future studies which could include additional qualitative data (e.g. student observations; student artifacts) to triangulate the participant student interviews they have used. Additional data validity could also be provided with pre-post test scores and self- assessments.

Learners' perceived usefulness was also assessed by Yoshida (2016). The participants were Japanese university students who major in education, experienced FC for five weeks. The survey they completed gave 14 out of 20, important usefulness statements on FC (see Figure 2.3), following a frequency analysis, classified into four clusters: *enhancement of classroom instruction, review and confirmation, learning effectiveness* and *productivity and self-paced learning* (p.430). These were proven useful in identifying the contents and structure of FC from the student-teachers' point of view and their perceived usefulness of '*flipped learning'* on instructional design for elementary and secondary education, taking into consideration in forming the final lesson design template in this research.

Items	Frequency	%
"Flipped learning" is useful because…		
1. learners can study through the video over and over again.	42	65.63%
2. it enhances learners' understanding.	34	53.13%
3. learners can study at their own pace.	20	31.25%
4. learners can stop the video whenever they want to.	19	29.69%
5. learners can study on their own time.	19	29.69%
6. it enhances the effectiveness of classroom lessons.	16	25.00%
7. it develops learners' readiness for classroom lessons.	14	21.88%
8. it increases the amount of project-based activities in classroom.	13	20.31%
9. learners can use the videos to review what they learned.	13	20.31%
10. it provides prior knowledge for project- based activities in classroom.	13	20.31%
11. it enhances learners practical expertise.	12	18.75%
12. learners can check their understanding through quizzes on the videos.	10	15.63%
13. learners can identify what are important through quizzes on the videos.	8	12.50%
14. learners can develop study habits.	7	10.94%
15. learners can concentrate on their study.	2	3.13%
16. it is useful for designing classroom lessons.	2	3.13%
17. learners can study on mobile-phones/smartphones.	2	3.13%
18. it enhances learners' motivation.	1	1.56%
19. learners can download the videos.	1	1.56%
20. learners can study through their eyes and ears.	1	1.56%

Figure 2.3. *Perceived usefulness of 'Flipped Learning', Yoshida, 2016, p. 432*

2.3.2 Level of education.

Many studies have been conducted in secondary education with more practical examples in enhancing learning through a FC approach (e.g. Hao, 2016; Kirvan, Rakes, & Zamora, 2015; Moran & Young, 2015; Winter, 2018) or in combination with IBL activities (Mazur et al., 2015; Morgan 2014; Yoshida, 2015). Mazur et al. (2015), through an action research approach, set the first three principles of the Teaching Effectiveness Framework (Friesen, 2009) to assess three learning designs using FC instruction: (a) *Teachers are designers of learning*; (b) *Work students are asked to undertake is worth their time and attention*; and, (c) *Assessment practices improve student learning and guide teaching*. Findings in their research indicated both strengths and areas for improvement, particularly in assessment practices, recommending further action research in FC in K-12 classrooms.

Students' flipped learning readiness was surveyed by Hao (2016), using 387 middle school 7th-graders and the Flipped Learning Readiness Scale, designed by the researcher. The scale was a modification of the Online Learning Readiness Scale (OLRS) (Hung, Chou, Chen, & Own, 2010) and the ICT literacy scale (Lau & Yuen, 2014). The quantitative data analysis showed that the students' flipped learning readiness ranged from a level slightly above neutral to below-neutral. It was also found that:

> '…*Personal characteristics and individual circumstances, including language beliefs, student perceptions of teacher characteristics, the availability of outside-school support and resources, learning performance, study time and net-surfing time, can make a difference to the levels of the readiness dimensions*' (Lau & Yuen, p. 295).

The importance of this paper is the issue of student readiness for flipped learning and the individual differences should be taken into consideration during FC design, as to maintain the maximum learning benefit from the approach. Differentiation was also an issue raised in the study of Winter (2018).

Student motivation and related performance on a 6th grade social studies course at a K-12 private school in Hawaii was collected using a Likert-type survey. Findings suggested that '*flipped learning benefits average achieving students through differentiated instruction'* (Winter, 2018, p.176). The practical implications of the research included the use of learner-centred strategies for maximizing student engagement levels, whereas it suggested further research in differing K-12 environments. The limitations of the research were the small participant size and the researcher being the sole implementing educator, asking for a multi-case study approach which the current research adopted.

Such quantitative studies, testing the effectiveness of FC and identifying students' perceptions through surveys, have been carried out by numerous other researchers in higher education (Baepler et al., 2014; Chen & Summers, 2015; Love et al., 2014; McLaughlin et al., 2014; Missildine et al., 2013; Tune, Sturek, & Basile, 2013; Warner, Koufteros, & Verghese, 2014). Although several of these studies have been identified in trying to define flipped learning in comparison to traditional methods, giving practical examples and focusing on students' perceptions, there is no research found that tries to understand the real attractiveness of the method/model through close and multiple classroom observations, or that tries to understand the phenomenon from the perspective of the teachers using it. They lack the pedagogical principles to guide the design, implementation and evaluation of the FC method (Kim et al., 2014), as only 7% of current research has used real classroom observations as a means of data collection (Zainuddin & Halili, 2016).

All in all, although many research studies on FC have been conducted in various domain subjects, few studies have been carried out in primary education. Zainuddin and Halili (2016) have highlighted that the participants or samples of the most influential FC research between 2013-2015 have been undergraduate or graduate level students (Baepler et al., 2014; Chen et al., 2014; Davies et al., 2013; Enfield, 2013; Galway et al., 2014; Hung, 2015; Kim et al., 2014; Love et al., 2014; McGivney-Burelle & Xue, 2013; Mclaughlin et al., 2013; Missildine et al., 2013; Roach, 2014; Simpson & Richards, 2015; Talley & Scherer, 2013; Tune et al., 2013; Warner et al., 2014). This means that current research does not directly benefit K-12 teachers and that teachers who would feel keen to implement the approach are left with little support highlighted by Borrmann (2014) and Yoshida (2016). Even Bergmann and Sams, the so-called originators of flipped learning, published a guide for elementary school implementation (Bergmann & Sams, 2016) in an attempt to address the need, yet not based on empirical research.

The first attempt to implement a FC model in a Greek educational context of K-12 was a very recent research by Kostaris, Sergis, Sampson, Giannakos, & Pelliccione (2017) for ICT teaching within the Greek National Curriculum, very similar to the Cyprus National Curriculum. Even though action research has hardly ever been touched on in the studies of the FC, Kostaris et al. (2017) integrated the four-phases of action research (Plan, Act, Observe and Reflect) into the FC, and provided evidence for potential advantages of the FC model in students' cognitive learning outcomes and their level of engagement. Similar results were reported by Hultén and Larsson (2016), taking up a research in

Swedish primary schools, implementing a bottom-up FC strategy. Moreover, another research, by Hwang and Lai (2017), employed a quasi-experimental study in mathematics learning in a primary school, aimed in facilitating and bridging in- and out- of-class learning using an interactive e-book-based FC approach. The instructional videos, quizzes and learning guidance provided by the teacher were integrated into e-books and presented on mobile devices. The results indicated that the proposed approach not only endorsed learners' self-efficacy for mathematics, but also enhanced their learning achievement, especially students with lower self-efficacy.

Aidinopoulou and Sampson's (2017) research in a Greek primary school concentrated on history teaching and revealed that there is encouraging evidence for potential benefits of the FC model in primary school social studies courses. Their study revealed that '*indeed the classroom-based sessions of the experimental group were used for engaging student-centered activities and that this resulted into better learning outcomes in terms of demonstrating critical Historical Thinking Skills (HTS)*' (Aidinopoulou & Sampson, 2017, p.237). Gough, Dejong, Grundmeyer and Baron (2017) also examined 44 K-12 teachers' perceptions that utilize FC in Southwest and South Central Minnesota through a researcher-developed survey instrument. It was found that additional time for active learning and increased student-teacher interaction is valuable, a valuable benefit of the FC model.

Despite such recent attempts to 'decode' the FC model in primary education, key data thus far are mostly from secondary and higher education. Overall, this review identifies the gap in existing scholarship on flipped classroom instruction in primary education, specifically pertaining the main subject areas (Language, Maths, Science, Social Sciences) and instructional design '*intended to maximize class time when implementing flipped classroom instruction'*, which had been the target of Mazur et al. (2015, p. 3) research in Grade 9 students (secondary education). Moreover, because of the mixed impact of FC on students' learning outcomes and students' perceptions of FC, research into pedagogical design is needed in employing a set of research methods and combining frameworks (e.g. Jungić et al., 2015). Moreover, a close investigation of the pedagogical process would give light into the principles for an effective implementation, focusing on all stakeholders' experiences and perceptions: teachers', students' and parents', not just on one of them.

2.4 Inquiry-Based Learning (IBL)

Key studies on the IBL model were also collected through a four-phase process (Cooper, 1998) using a systematic electronic search of the same academic and online libraries and databases. The keywords used during the search included: *inquiry-based learning model, inquiry-based leaning methodology, benefits and challenges of inquiry-based learning,* combined with *elementary and primary education* and *K-12 education*. During the second phase of the search process, the abstract, summary and references of chosen resources were studied and in total, a number of 27 articles, 5 book chapters, 5 books, 2 conference papers and one online post were selected.

The final choice of journals to be retrieved and used for the study in the third phase was based on the following rationales:

- A specific focus on the IBL model with analyzed frameworks on the methodology and the theory behind it.
- Referred journals which were indexed by prominent databases.
- A current publication in the last 10 years, with exceptions on key studies related to the model, such as '*Problem based learning: An instructional model and its constructivist framework'* (Savery & Duffy, 1996).
- Containing a combination of IBL within a FC model in any subject matter across any educational level, especially primary school education.
- Containing technology integration models in line with the IBL model and/or its combination with the FC model.

The journals and books which did not meet the above criteria were not included within the literature review.

In the fourth final phase, the sources were again categorized by: (a) authors names and year of publication; (b) type of document; (c) location of the university of the first author; (4) type of research (conceptual versus empirical); (5) type of education, and; (6) the main findings of the theoretical search (see Appendix 1). Their content was grouped into three main themes, as analysed below: (a) Defining IBL; (b) Benefits and challenges of IBL; and, (c) Combining IBL with FC methodology, i.e. the integration as a challenge of overcoming FC and IBL limitations.

2.4.1 Defining inquiry-based learning.

IBL is a pedagogical method which refers to:

> '*The process of posing questions, problems or issues, gathering information, thinking creatively about possibilities, becoming proficient in providing evidence, making decisions, justifying conclusions, and learning the ways of challenging, building upon and improving knowledge of the topic or field of study*' (Friesen, 2013, p.154).

It therefore encourages students to explore, conjecture, discover, collaborate, and communicate (Laursen & Kogan, 2014; Savery & Duffy, 1996; Stephenson, 2012) by operating multiple perspectives and various types of knowledge, such as mathematics, science, language, and arts (Short & Harste, 1996).

There are two essential elements to IBL that most researchers are in agreement with (e.g. Justice et al., 2007; Van den Berg, Admiraal, & Pilot, 2003). First, students manage the acquisition of knowledge, including the pace at which it happens, and second, they should be responsible for supporting the new ideas presented. That is, the instructor is not the sole authority and the majority of class time is spent on student-centered activities. These provide opportunities for discussing and criticizing ideas, working on problem-solving activities and presenting solutions. The instructor's main role is '*to foster a safe environment, facilitate discussion, and redirect as necessary*' (Love et al, 2015, p.746). In an IBL course, instructor and students have joint responsibility for the depth and progress of the course. Hence, the instructor's main role is not lecturing but to be proactive (Maaß & Doorman, 2013). Instructors should be supportive to struggling students and challenging to succeeding ones through strategic questioning. Within an IBL classroom, a shared sense of ownership exists. Such conditions reinforce inquiring minds and attitudes which are essential for developing the ability to face and manage uncertain futures (Artigue & Blomhoej, 2013).

Justice, Rice, Warry, and Laurie (2007) suggest that IBL refers to both a process of pursuing knowledge and new understanding, as well as a method of teaching based in such a process. The Model of Inquiry Process they propose has been adapted to include the following steps the students need to undertake: (a) Engage a topic and build a knowledge base; (b) Develop a question; (c) Determine what needs to be known; (d) Identify resources and gather data; (e) Evaluate the data; (f) Organize and synthesize data; (g) Communicate new understandings; and, (h) Reflect upon the process and success.

Further support for the use of IBL stems from the strong theoretical foundations of the model including constructivism, cognitive research on motivating students, intellectual development and approaches to learning (Prince & Felder, 2006). However, the research on learning styles is given with caution, as many learners may feel uncomfortable with research approaches and thus enough support is needed to make the transition (Healey, 2005). The benefits and challenges of IBL are explained below.

2.4.2 Benefits and challenges of IBL.

Benefits

When students are asked to engage in IBL in class, deeper understanding is promoted through active questioning, critical thinking and investigation (Bergmann & Sams, 2008; FLN, 2014; Mazur et al., 2011; Ullman, 2013). Exploring real-world problems, consulting experts and conducting field research enhances social interaction and active knowledge building (Cornelius-White & Harbaugh, 2010). The teacher does not lay out all the theorems, formulas and previous knowledge but active learning is promoted (Mazur & Board, 2015). In particular, such student-centered activities promote cognitive goals of the higher levels of Bloom's revised taxonomy such as Analyzing, Evaluating and Creating (Krathwohl, 2002), as opposed to activities that promote cognitive goals of the lower levels of Bloom's taxonomy, such as Remembering (see Figure 2.1). A large study by Laursen and Kogan (2014), in a Mathematics undergraduate course who assessed long-term effects of IBL, highlighted the benefits of this method to low-achieving students.

Challenges

As with all teaching methods, IBL has its limitations. Flick and Lederman (2004) identified that '*learning how to learn'*, essential in IBL, can be a very challenging task to master especially for low achievers who may have a limited pre-knowledge base and a lack of self-discipline. Moreover, during IBL, learning is student centered and the teacher works only as a facilitator (Kim & Chin, 2011). Hence, teachers should spend a lot of preparation and planning time to meet students' needs during the investigation and also manage in-class time well to make sure content is covered. Assessment of work can also be very difficult as students can take their investigations beyond the expected requirements. Rubrics are therefore essential for guidance. Beliefs, attitudes and worries over incorrect outcomes of experiments or activities may be additional internal problems during IBL (Magee & Flessner, 2012).

2.4.3 Overcoming FC and IBL limitations- The integration.

Many studies have described how traditional teaching of social studies is challenged by both the use of technology and the adoption of IBL strategies in other subjects, such as Science, Technology, Engineering, and Math (STEM) (Bishop & Verleger, 2013; Hwang et al., 2015; Keengwe & Onchwari, 2015). Hence, despite of the drawbacks, the benefits of IBL encourage a change from the traditional lecturing in class, exploiting innovative pedagogical designs supported by digital technologies (Lyons, 2008).

Such a change could normally happen in any subject but with time constraints due to curriculum goals, hence the success of IBL teaching could be challenging. One of the ways to get through the required content and also benefit from IBL is the combination of this teaching method with a flipped style of teaching (Love et al., 2015) or the use of IBL features within a FC model (Çakiroglu & Özturk, 2017; Chen & Chang, 2017; Huang & Lin, 2017). One such example is Chen and Chang's (2017) research in a higher education context using the SOP² model ('S': Self-study, 'O': online group discussion, and 'P2': Double-stage Presentations) into the FC. Hence, one way to eliminate drawbacks of FC is to combine it with IBL teaching, both at home (pre-class and post-class activity) and at school (in-class activity). Song and Kapur (2017) even proposed a '*productive failure-based flipped classroom'* (p. 292) in a secondary school, inverting the traditional FC model by engaging students first in IBL activities and then providing video tutorials at home, as this may be better able to improve students' problem solving skills.

Therefore, based on (a) the capacity of the FC model combined with an IBL model to enhance students' learning experiences (Giannakos et al., 2014; Rahman et al., 2014); and, (b) the current lack of any such evidence in relation to pedagogic principles of FC in K-12 teaching discussed before, despite the promising relevant findings in the higher education context, a research challenge is identified. This challenge relates to investigating the UDPs of the IB-FC model in primary education, a FC design model for IBL. This challenge will be addressed through the research framework described in the next section.

2.5 Theoretical Framework

Although flipping a class usually involves students reading or watching videos before class, and IBL focuses on allowing and encouraging students to develop material on their own, '*both styles emphasize active learning and critical thinking through activities such as group work and presentations while minimizing lectures*' (Capaldi, 2015, p.736). As explained in the literature review, the two teaching styles/models can complement one another in many ways and be implemented concurrently (Gorman, 2014). This is what this research aims at, exploiting the benefits and minimizing the drawbacks of the two models, developing IB-FC instructional designs/learning cycles (Jong, 2017), and in turn guide us towards filling the gap of stated UDPs of FC in primary education.

Figure 2.4 illustrates how in a typical day both models share in principle the same list of activities, differentiating in the pre-class activity and its assessment. Variations between group and individual work exist. However, compared to a traditional 90–95% lecture class course, both models are inherently active allowing increased group learning time to try and develop higher-order thinking skills.

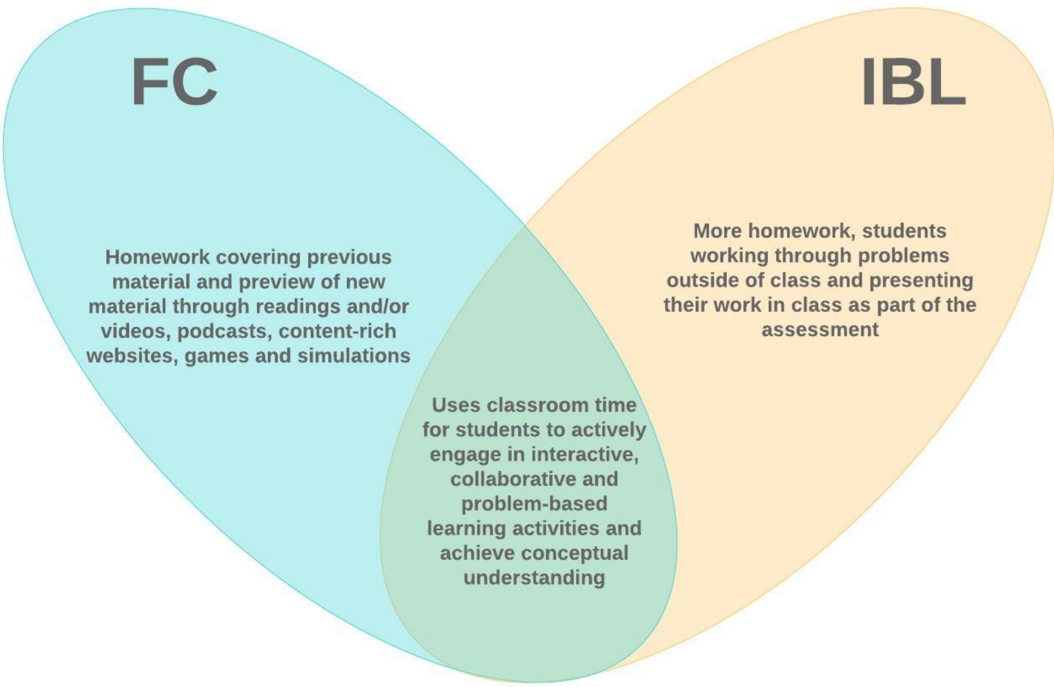


Figure 2.4. *FC vs IBL activities*

Two key features of the combination of FC and IBL are *engagement* and *conceptual understanding*. Students need to be engaged with material and not passively listen to it. In FC, students are supposed to view flips and all assigned material before in-class time whilst if IBL methods are used during in-class time, more leading questions will be used on the material covered at home compared to giving direct answers, leading to group discussions (Lo & Hew, 2017). The purpose of engaging with content is to gain deep conceptual understanding. Research showed that this is not gained through lectures (Epstein, 2013). This goal is one of the simple reasons that FC and IBL approaches go so well together in many disciples (Hung, 2015).

When combining flipped pedagogy with IBL, most of class time should be spent on group work and presentations. These activities can involve problems from the pre-class reading or video, or new problems first seen in class (Capaldi, 2015; Pierce & Fox, 2012). One method of incorporating IBL into the FC is for students to solve harder examples using new strategies not seen in the reading or watching the video. Working through difficult questions often generates a rich discussion within groups.

While IBL and the FC are both newer innovations in teaching, a partnership of the two is proposed in this research to increase student engagement and learning. Past research on teaching a hybrid flipped/IBL class in Maths (Capaldi, 2015), STEM courses (Love et al., 2015) or even in pharmacotherapy modules (Pierce & Fox, 2012) in higher education showed that the combination had been successful as they are natural partners. Aidinopoulou and Sampson's

(2017) research on FC in a Greek primary school concentrated on history teaching and revealed that, the classroom based sessions of the experimental group were used for engaging student-centered activities and this resulted into better learning outcomes in terms of demonstrating critical thinking skills. Therefore, IBL is a perfect instructional practice to use for the freed-up time arising from FC implementation (Love et al., 2015). Encouraging collaboration and communication of new knowledge learned from flips between learners features injecting IBL into FC and vice versa, which in turn increases confidence and helps students to understand how to learn and thus creating lifelong learners.

Analyses of the available literature on the FC approach suggest the employment of conceptual frameworks to direct practice and research (Bishop & Verleger, 2013; O' Flaherty et al., 2015). Winter's (2018) conceptual framework (see Figure 2.5) has been valuable in differentiating between the emphasis and interaction of the individual and the respective group learning space. In particular, the gradual shift from a teacher-centred space (at home) towards a student-centred space (in class) and from cognitivism to constructivism, is visualised in the framework.

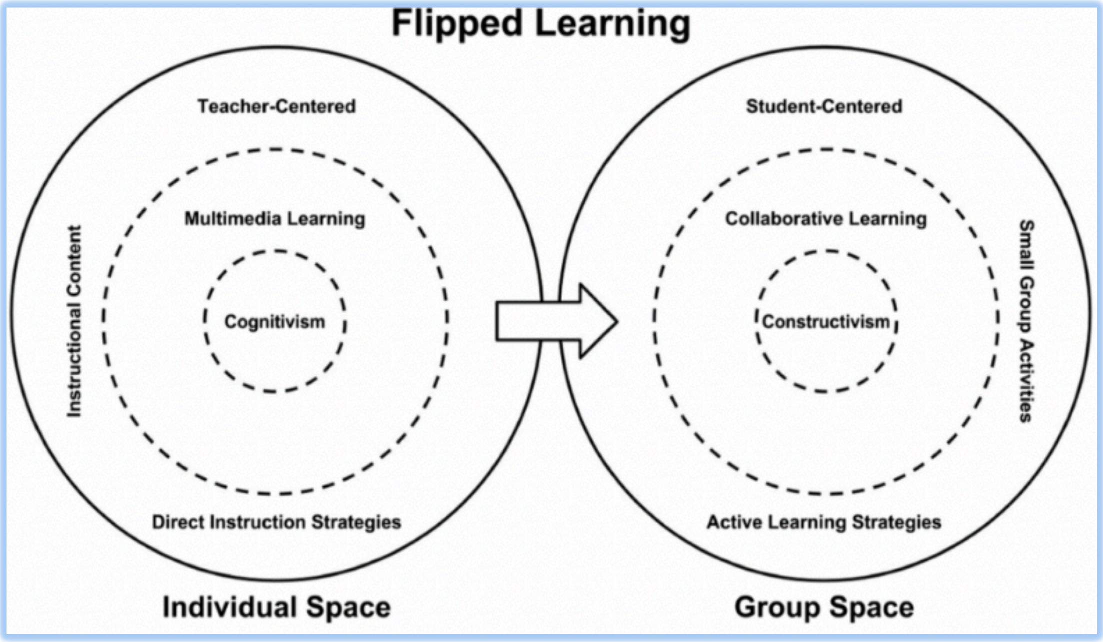


Figure 2.5. *Interaction in the individual and group learning space in Flipped Learning, Winter, 2018, p.178*

As previously explained, identifying a lack of theoretical background underlying a FC pedagogical design, and in an attempt to keep students engaged and instill deep content knowledge, the theoretical framework of this research aims to combine the use of FC and IBL, called the IB-FC framework. This is illustrated in Figure 2.6 below.

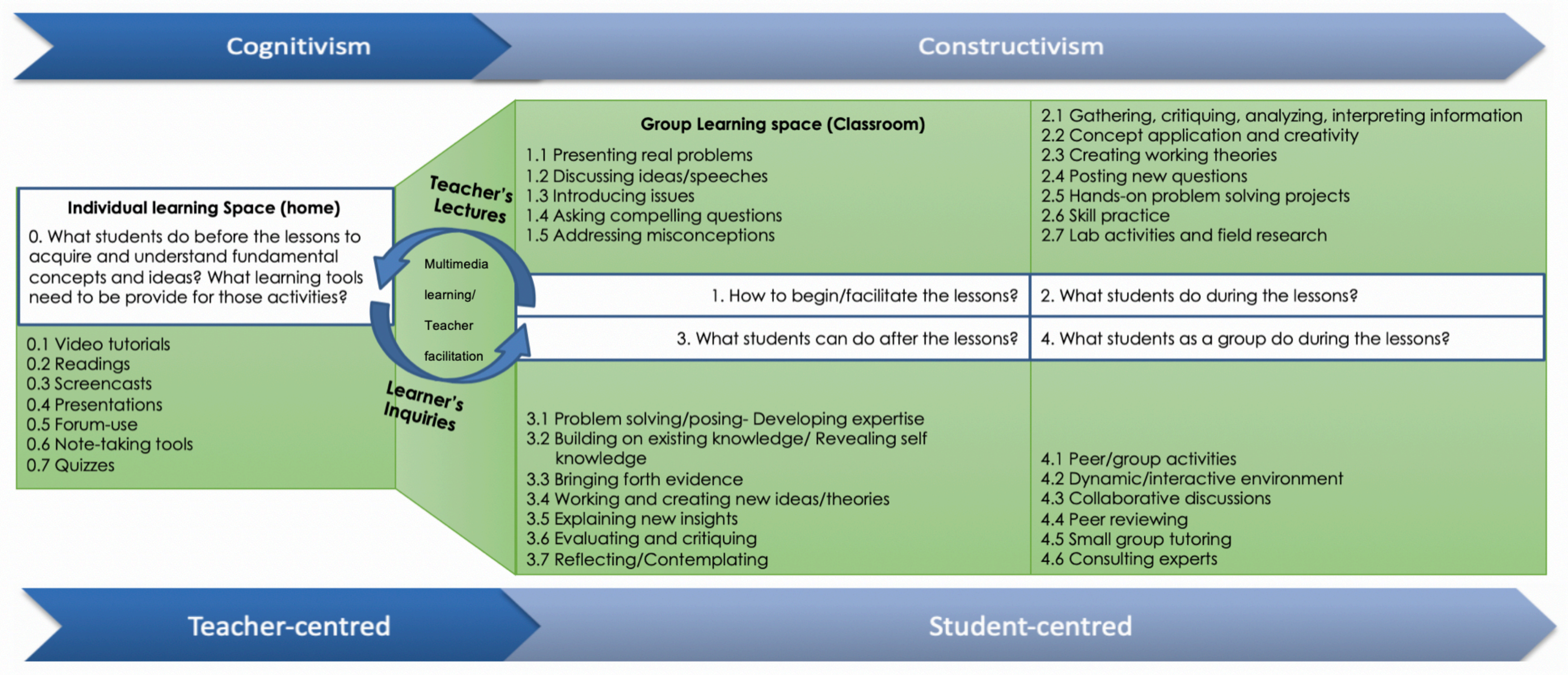


Figure 2.6. Visualisation of the initial IB-FC framework

The first version of the framework was developed to guide the pilot research, following principles arising from the literature, using terminology from the Flipped Learning Network (2014) and distinguishing between in-class and out of class activities, since:

> '*Flipped learning is composed of two integral but inherently different learning spaces: an individual learning space that includes instructional content enhanced by technology and a group learning space or collaborative environment. Each space is didactically distinct and rooted in separate learning theories.'* (Winter, 2018, p. 177)

The framework was modified for the research in line with the benefits of the FC methodology arising from the implementation of the pilot study, in combination with the IBL activities.

In particular, the core support for each learning space is different. The individual learning space instruction, which is teacher-centered, is facilitated through technology. Students have access to teacher-given or teacher-created content such as video tutorials, readings, screencasts, presentations and/or quizzes. The FC methodology in this learning space includes how students use these resources (e.g. through forum-use, use of note-taking tools) to understand fundamental concepts and ideas, i.e. cognitivism. Thus, this part of the framework is supported by cognitive theories which emphasize psychological activity and '*learning by viewing*' versus '*learning by doing*' (Clark & Mayer, 2008, p. 5). This foundational knowledge, attained through multimedia learning principles (Day & Foley 2006), is then applied in the group learning space with the teachers' facilitation. Multimedia learning and teacher's facilitation, although more present in individual than group learning space respectively, play a crucial role in both spaces within the IB-FC framework. Active learning in the group learning space (Baepler et al., 2014) is supported by constructivist theories emphasizing group knowledge construction and '*learning-as-participation*' (Sfard, 2009, p.555). The arrows in the framework represent how the two learning spaces feed each other, i.e. teacher lectures feed both spaces with the content to be learned and practiced and the learners' inquiries arise both in class and at home and are vital for further investigation. Moreover, the four main categories of benefits identified through the focus groups discussions and student forum reflections in the pilot study guide the Group Learning Space activities focusing on: *1. How to begin/facilitate the lessons?; 2. What students do during the lessons?; 3. What students can do after the lessons?; and, 4. What students as a group do during the lessons?.* These are further analyzed for particular IBL activities (some of them already used in the pilot study), linking the individual learning space created by the FC model**.**

This draft framework has guided teachers in the current multiple-case study and supported the important part of their TPD towards the initial write-up of the IB-FC instructional designs, in combination with several IB-FC instructional tools (e.g. orchestration routines, digital tools, IBL activities, entrance/exit tickets) developed for providing extra support to the teachers. This framework will be further modified in Chapter 7 according to research results and stated UDPs.

Chapter 3: Research Design

In this chapter, the research design will be explained. The pilot study played a substantial role into the research overflow and will be described along with the Moodle design and research methodology.

3.1 Pilot-design and results

3.1.1 The design of the pilot study.

To address the challenges discussed in the previous section and assess the potential effectiveness of the IB-FC model, a single case study of a pilot nature, was conducted in a Grade 5 (students aged 10-11) Geography class with 17 students, at a sub-urban public primary school in Cyprus. The school had no tradition in the implementation of TEL methodologies, although this particular group of students previously had a chance to work via a Moodle (a VLE) and Mahara platform (an e-portfolio platform) since their teacher, the researcher (myself), had been involved into various ICT projects in the pilot year of the research. Due to a lack of technological facilities (e.g. computer lab at school), students would bring their own device to school to work with and the teacher would implement blended learning methodologies (using electronic devices as well as traditional means, i.e. pen and paper/books). This case study was implemented towards the end of the school year (June, 2017) when these students have had the chance to familiarize themselves with basic NL tools, such as some online applications with enhanced networking, collaboration and digital skills.

The pilot study was designed using the key research on FC in higher education settings, borrowing practicing frameworks and adapting them to primary education. Successful methods documented in the literature differentiated between time in- and out- of class. In-class activities usually range from knowledge building, to collaborative discussion, small group tutoring, hands-on and problem-solving projects/activities, skill practice, lab activities, speeches, conversation, exploring real problems, peer reviewing etc. (Bergman & Sams, 2008, 2012; Hamdam et al., 2013; Project Tomorrow, 2013; Toto & Nguyen, 2009). Out of class activities concentrate on videos, presentations, forum-use, note taking tools and preparatory procedures, e.g. entrance tickets etc. (Hultén & Larsson, 2016).

The learning activities designed for this pilot study, with consideration in all of the above factors, are illustrated in detail in Table 3.1. The activities follow a sequence of pre-class to in-class and after-class session, i.e. from the individual to the group learning space and back to individual learning space. The activities exploit technologies such as Mahara, Moodle, Google Drive and online tools and applications, with in-class activities targeted to promote IBL methodology. Students had three days to study the content during pre-class (Activity 1), prepare the mind-map (Activity 2- see Figure 3.1) which would serve as an entrance ticket to the lesson and pose any questions/inquiries or suggestions regarding the learning process to be followed in class in the forum provided (see

Figure 3.2). During the in-class activities, Activities 4 and 5 were introductory to the lesson, focusing in analyzing and using the entrance ticket for revision and for answering the questions posed in the forum by the students during pre-class. The IBL tasks of Activity 6 have taken six learning periods (40' each) to complete, during which students worked in groups of four. Four more learning periods (40' each) have been used for completing the creative activity (Activity 7), whereas the after-class activity involved assessment through the use of rubrics and the completion of the e-portfolio page, each student working approximately one hour alone.

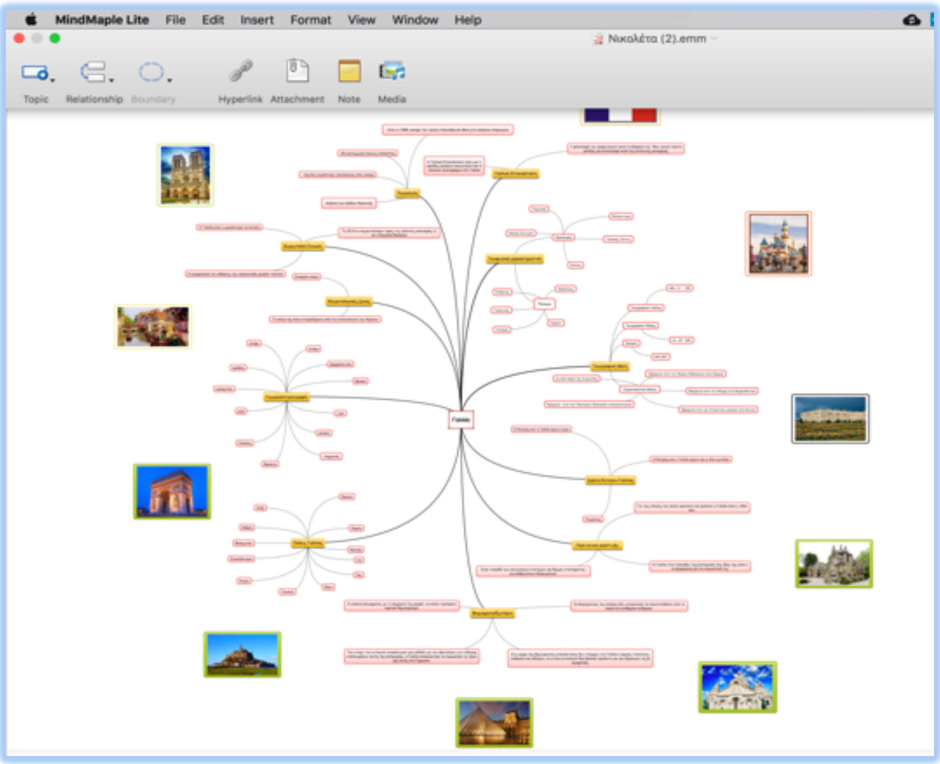


Figure 3.1. *Example of an entrance ticket: screenshot of a mind-map on MindMaple*

Learning Activity	Phase (Duration)	Technology
1.**Study of content/resources- Use of tools and multimedia:** Videotutorial/flip, Geography book, school Atlas, Google Earth, YouTube videos, tourist guides, online sources.	Pre-class Individual learning space (3 days)	Mahara Google Earth Youtube Electronic maps
2. **Preparation of mind-map (entrance ticket)** Students have an example of a mind-map created on MindMaple and shared through the classroom Google Drive which shows the different parameters they can focus on whilst reading/studying the material given (e.g. tourism, industry, geophysical characteristics etc.). Students complete their own mind-map and share it through the class Drive before the lesson. This will be used for completing the IBL tasks during class.	Pre-class Individual learning space (30')	Google Drive MindMaple
3. **Posing questions/areas of exploration in the forum** Students use the forum which is linked to the lesson on the Mahara platform to pose questions on the content they have studied and propose areas for further exploration during class time.	Pre-class Individual learning space (30')	Mahara forum
4. **Use of entrance tickets to revise main points and information about France** Students use their groups' flipcharts to fill-in the blanks on a France map and hence any queries on main geophysical characteristics are resolved.	In-class Group learning space (10')	Google Drive
5. **Forum replies and analysis** The teacher answers any questions posed in the forum and guides the class towards identifying the parameters to be further explored by themselves using the internet to gather and analyze information.	In-class Group learning space (20')	Mahara forum
6. **Problem solving project/IBL activities: Paris Marathon preparation** Each group lives in a different country and aims to run in the Paris Marathon 2017. Therefore, some travelling preparation is needed, besides the daily exercise before the race. Students use a Google Slides presentation to complete the following tasks within it. Instructions given: (a) *Use Google Earth to put a pin on your own country (different for each group) and a pin on Paris. Specify the orientation and embed a screenshot in your presentation* (b) *Calculate, using the Google Earth ruler, the distance (in km) you will have to travel in order to reach your destination.*	In-class Group learning space (6 periods, 40' each)	Mahara Moodle chat Class Drive (Google slides) Google Earth Animoto Google Forms

(c) Search and find what the weather would be like at this season in Paris, so as to pack the right clothes with you. Think about visiting other towns in France as well. How different the weather would be? Record that and consider it whilst packing-up. Talk about the different climatic zones across France and how these translate into weather differences (how and why?) *(d) Create a list of monuments you would like to visit in your free time during the Paris Marathon. Use the internet to find the right information and explain your choice of monuments. Use pictures, videos and any other multimedia for presenting your answer. Take a note of the resources you have used.* *(e) Create a short video with your team of the most important documents using the online application Animoto. Post your video in the classroom blog (using the embed function).* *(f) Create an online research for the rest of the school, using Google Forms, regarding their choice of Paris monuments and post it on the classroom blog (in Blogger). Post it right after your Animoto so as to guide them.* *(g) Analyze the research results, using Google Sheets and create graphs. Post your analysis on the classroom blog.* *(h) Which are the local products you would buy for your mum and bring back home to her? Do a relevant research and make a list, giving reasons for your choice.*		Blogger Google Sheets
7. **Final presentation of problem solution/results** Students have a choice to use any tools that they are familiar with and gather all relevant information for a group presentation during Activity 6.	In-class activity Group Learning Space (4 periods, 40' each)	Students' own choice of tool: e.g. Blogger, Sway, Voki, Scratch etc.
8. **Assessment** Students use rubrics for individual self-assessment and complete their e-portfolio on Mahara. They then report to the forum their goals for the next lesson (everything they believe they should improve in, e.g. communication, collaboration, information literacy etc.).	After-class Individual learning space (1 hour)	Google Sheets Mahara Moodle forum

Table 3.1. *Sequence of learning activities: Pilot implementation of the IB-FC model*

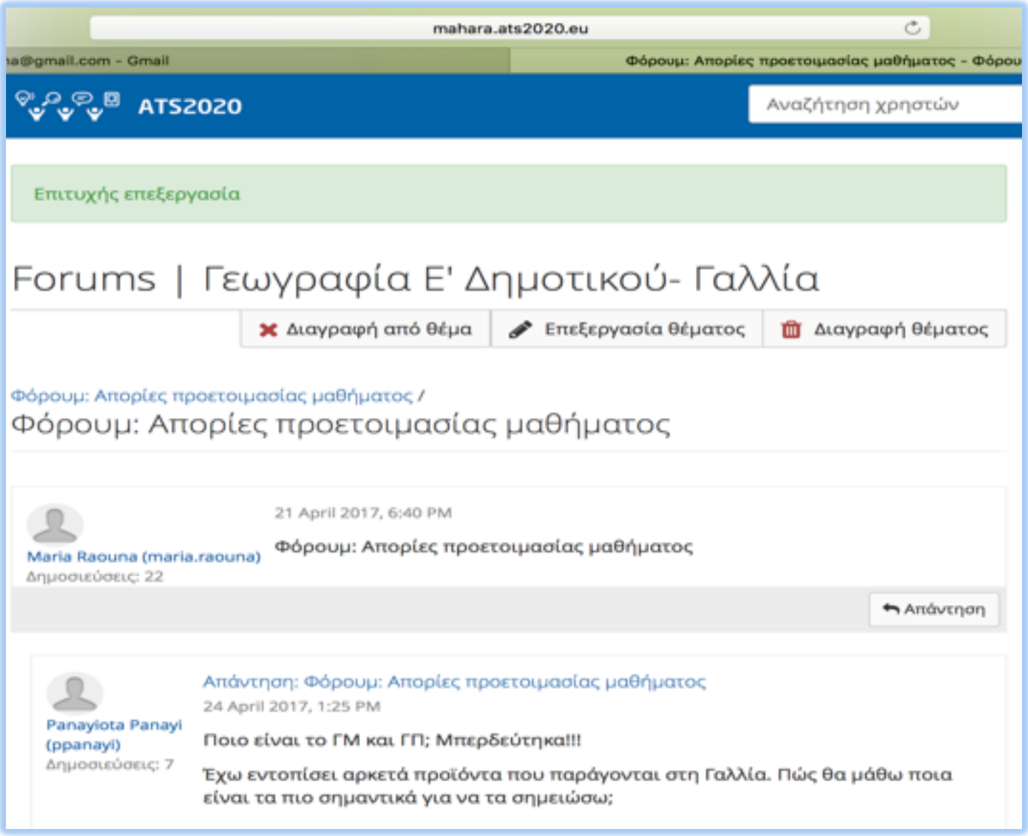


Figure 3.2. *Pre-class forum for students' questions/suggestions: screenshot from Mahara*

3.1.2 Results of the pilot study.

At the end of the pilot implementation, focus groups (3 groups of 6-6-5 correspondingly) were used for discussing the IB-FC lesson, with an emphasis on perceived benefits and/or challenges and limitations. Individual written responses were important as young students may feel more comfortable in expressing their views and experiences in writing, hence a reflection forum on Moodle was used. Names were erased and the same code (PS- Pilot Student) for each participant used in both data collection tools was applied (PS1-PS17).

The data collected from the focus groups discussions and the student forum reflections were analyzed and categorized into benefits and challenges (Loizou-Raouna & Lee, 2018a). These are analyzed below.

Benefits

(i) Extending the educational process: The study of content before and after class–time extended learning beyond the classroom and within a more social context as expertise knowledge was also made available through the flips and online material. This gave the students the confidence that '*we know what we are doing'* (PS1). During class-time, students had the chance to integrate new ideas into their learning, evident in the quote: '*Google Earth was hard but now it's easy. Actually, I will use it for all my Geography classes from now on…It's good to explore before the lesson. Makes you feel smart*!' (PS10).

(ii) Autonomous learning: Students emphasized how they have been supported in gathering, critiquing and analyzing information on their own through the availability of multiple and varying sources of information they had to study at home, e.g. '*If I didn't understand one of them, I had a different source to look at. That made it easier to find the information*' (PS8). Concept application later on in class, by using the entrance tickets, had been part of the benefits, as students learn to take responsibility of their own learning needs, whilst the availability of the forum '…*made it easier to question and do research' (PS2).*

(iii) Interactive learning: Students talked about how much they had enjoyed collaborating '*on something we had studied from before and prepared for it'*

(PS16), in the Moodle chat and how the forums made it easier. Google Drive also enhanced the creation of an interactive environment since '…*it* [Google Drive] *is like the wiki on Moodle, only you can edit same time with your partner*' (PS8).

(iv) Anytime teacher support: 'What a great time we had…exploring new areas with the teacher being there when we needed her! I say we keep doing this!' (PS2). Many of the students expressed their satisfaction of being able to discuss with their teacher in class any new ideas/concepts they had come across during research and in exploring new issues and concepts. Many misconceptions were addressed as '*We were able to pose any kind of stupid question we thought we had…and our teacher was there!*' (PS6); '*The time to do it in class was finally enough!'* (PS15).

(v) Improved assessment/evaluation processes: Self, peer and tutor assessment processes were made much easier since '…*we could also pause and rewind the teacher to check on what we actually had to do and how*' (PS10); '*Criteria rubrics were made available on Moodle and for every activity*…' (PS3). '*Reflection forums were hard to think about and write-up in the beginning'* (PS2), but students felt more prepared and skilled through practice. *'We worked together with the teacher, both in class and at home…the chat was there for guidance' (PS5).*

This methodology proved very useful since mutual agreement and acceptance on the learning process is important in choosing the right strategies which will lead to successful learning goals. Students recorded their prior-knowledge before watching the flip and set up their learning strategies in the forum which was made available before the in-class lesson. This has assisted in a better use of the entrance ticket, as student suggestions were considered, and a more integrated way of working on the rest of the activities was incorporated. Consequently, almost all activities ran smoothly, giving rise to the development of excellent e-portfolio pages, two of them gaining first placement national award at the *E-Portfolio Competition* organized by the CPI (June, 2017).

Challenges/Limitations

During the pilot, students needed access to a device and an internet connection, both at school and at home. This did not pose any problem since the teacher was able to borrow devices to the students who did not own one (2 in total). The most challenging part though was the creation of the mind-map as some students expressed a feeling of discomfort with the software they had to use, whilst others found the missing parameters '*too hard to spot'* (PS2). Other challenges involved the post-class task with the completion of the e-portfolio page. Some students said they didn't like the task and '*it took too long to finish'* (PS17). Overall, student perceptions had been very positive with minor exceptions, in cases where collaboration did not work optimally and in cases they faced a running problem with the software given for the activity (e.g. Google Earth, MindMaple), especially the students using tablets and not laptops.

3.1.3 Discussion/conclusion of the pilot study.

The pilot part of this research aimed at testing the potential of combining the two models in primary education in an attempt to see how the limitations of both can be overcome and their benefits exploited, thus answering two of the crucial questions: '*Is the young age of the learners an actual limitation*?' and '*Is FC only for grown up students?*'. IBL proved to serve as a perfect instructional practice to free up time arising from FC implementation with high school and university students (Love et al., 2015), but it seemed from the pilot that this can also be true with the young learners as well. Encouraging collaboration and the communication of new knowledge learned from flips between learners incorporating IBL into FC and vice versa as with older students showed to help increase student confidence and minimize limitations, such as lack of self-regulation skills and self-discipline. This has been feasible through the use of NL technologies, like Moodle as a VLE, and exploiting the potentials of both internal and external online tools.

Thus, following this pilot, the multiple-case study research was planned in order to provide much more valuable information about the experiences and perceptions of teachers, students and also parents through an IB-FC model implementation across many classrooms and disciplines.

3.1.4 Implications of the pilot study.

Concentrating on the benefits of the FC methodology in the pilot study, in combination with the IBL activities, a draft framework for combining both models was created (Loizou-Raouna & Lee, 2018a). The draft framework included the four main categories of benefits identified through the focus groups discussions and student forum reflections: *1. How to begin/facilitate the lessons?; 2. What students do during the lessons?; 3. What students can do after the lessons?; 4. What students as a group do during the lessons?.* These are further analyzed to particular IBL activities and included in the framework, as explained in Chapter 2 (see Figure 2.6).

3.2 Research Overview

A multiple case study approach (Stenhouse, 1985), otherwise known as '*collective case studies*' (Stake, 1994); '*a set of individual case studies'*, (Robson, 2002); or, '*multiple-case design*' (Yin, 2009), using action research methodology was employed in this research in addressing the current gap of how to design IB-FC instructions in primary education. A case study is '*a specific instance that is frequently designed to illustrate a more general principle'* (Nisbet & Watt, 1984. p.72), i.e. it focuses on understanding the dynamics of a single setting but can be used for inductive theory development and not only for description and deduction (Yin, 2009). The IB-FCs which have been gradually developed by the participant teachers in this research needed to be tested in real conditions, as Gorard, Roberts and Taylor (2004) suggested. Indeed, one of the strengths of case studies is that '*they observe effects in real contexts, recognizing that context is a powerful determinant of both causes and effects'* (Cohen, Manion, & Morrison, 2011, p. 289). Each case study in this research has been within a different real classroom setting, as the IB-FC instructions were implemented in various classrooms in different primary schools in Cyprus. Thus, the micro-context of each case study varied and had been defined according to school, grade, teacher etc. However, all case studies had a common macro-context, the Cyprus National Curriculum for Primary Education.

According to Yin (2009): '*A case study can enable readers to understand how ideas and abstract principles can fit together*' (p. 72-73), Therefore, multiple case studies assisted in highlighting differences and similarities, benefits and challenges in each, which helped to answer the three RQs. The different variables operating in each case and the implications involved in the implementation of the IB-FC instructional designs could not be collected by a single tool but by many sources of evidence (Cohen et al., 2011) as illustrated in the next section.

An action research approach was used in each case study. Action research is defined as a form of data-driven disciplined inquiry in which a practitioner (teacher- researcher) aims to understand, analyze and, potentially improve his/her practice (Cohen et al., 2007). In the context of this study, the aim was to investigate in each case study the implementation of IB-FC instructional designs for establishing the UDPs of the IB-FC model in primary education. The action research of this work was designed following the widely used four-phase process of Lewin (1948), namely *Plan, Act, Observe* and *Reflect*. More specifically, the *Plan* phase referred to the design of the research in terms of RQs, methodology and methods. Additionally, it included the educational design of the Moodle platform (http://www.protyposxoleio.com), the IB-FC tools (see Appendix 2) and the collaborative design (researcher and teachers) of the IB-FC instructional designs. The *Act* and *Observe* phases correspondingly addressed implementing the action research following the methodology adopted and collecting data. Finally, the *Reflect* phase referred to analyzing the educational and non-educational data collected towards answering the defined RQs.

Figure 3.3 below provides an overflow of the research design, distinguishing between each phase. The theoretical framework developed initially (see Figure 2.6) influences all four phases of the action research in each case study as well as the IB-FC tools, which were modified after data analysis, to include the UDPs as part of the results of this research. The importance of technology in bridging the out-of-class and in-class learning in all phases (Hwang et al., 2015) was also recognized within the research design.

The collaborative design of each research phase justifies how each participant acted as a practitioner who needs to improve his practice through an action research methodology. Indeed, the choice of an action research methodology involved empowering collaboration among the participants, working with other colleagues on common conditions and encouraging teacher reflection.

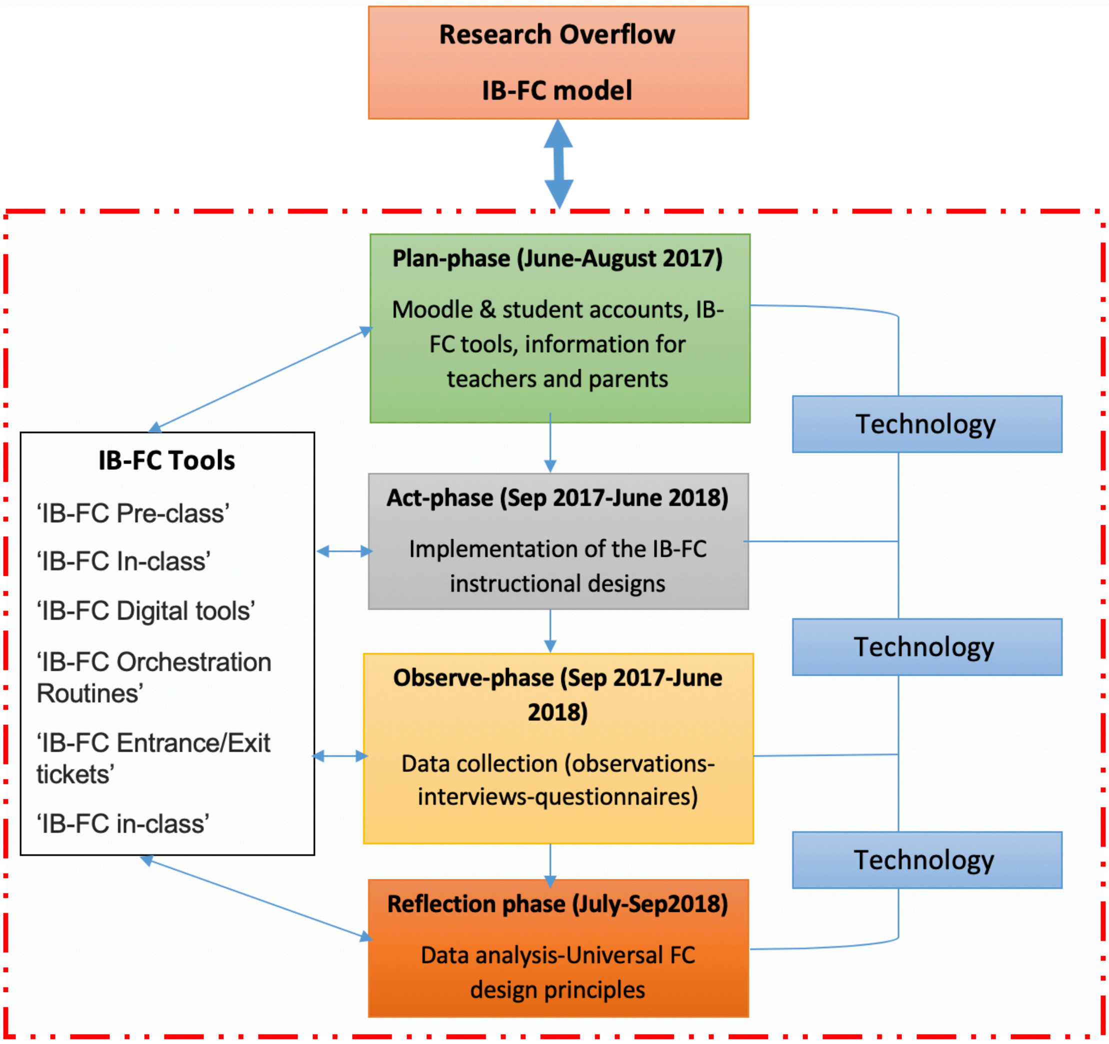


Figure 3.3. *Research overflow*

3.3 Moodle Design

Moodle was chosen to be the VLE of the research project. A domain name was purchased for the research (http://www.protyposxoleio.com) and the server hosting was paid for. Following the creation of the Moodle platform, a separate

Moodle page was created for each participant classroom (some of them combined as they shared the same teacher) which all together comprised initially the six case studies (8 classrooms). The 9th classroom did not participate at all since not enough parents signed the consent form. The blank space on the Home Page (Primary School 10) is being used this school year (2019-20) for post-research implementation in a Grade 3 classroom (teacher=researcher).

On the Home Page, a photo viewer from the pilot program implementation and students' achievements, together with the video which explains the aims of the research have been uploaded (see Figure 3.4).

Figure 3.4. *Moodle homepage (Screenshot)*

The link to the research blog was also included, together with the classrooms' pages and the separate Teachers' and Parents' page (see Figure 3.5). The content and use of the teachers' and parents' pages are explained in Chapter 4.

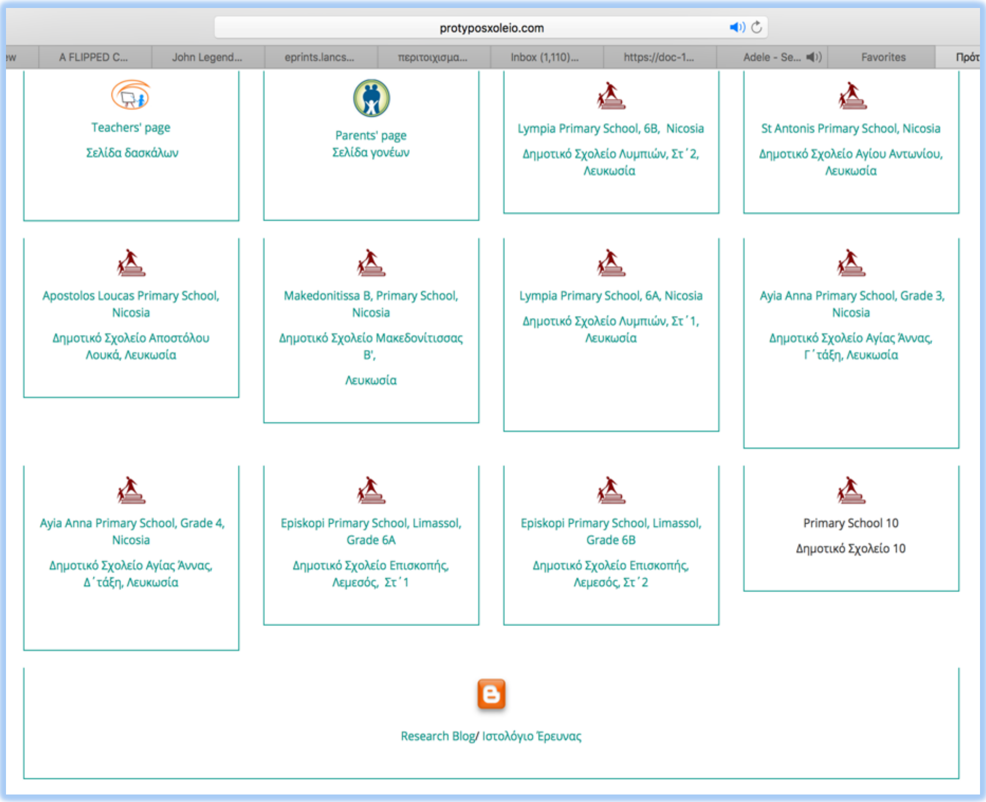


Figure 3.5. *Moodle page for each case study (Moodle home page screenshot)*

Teacher, parent and student accounts were created (usernames and passwords) in order to access the corresponding teacher, parent or classroom pages. Sub-pages for each subject were created upon each teacher's request. I have created a Moodle page for all the subjects I taught in Case Study 5 (see Figure 3.6). An additional '*Teacher's reflection*' *page* for each teacher was created within his/her classroom page.

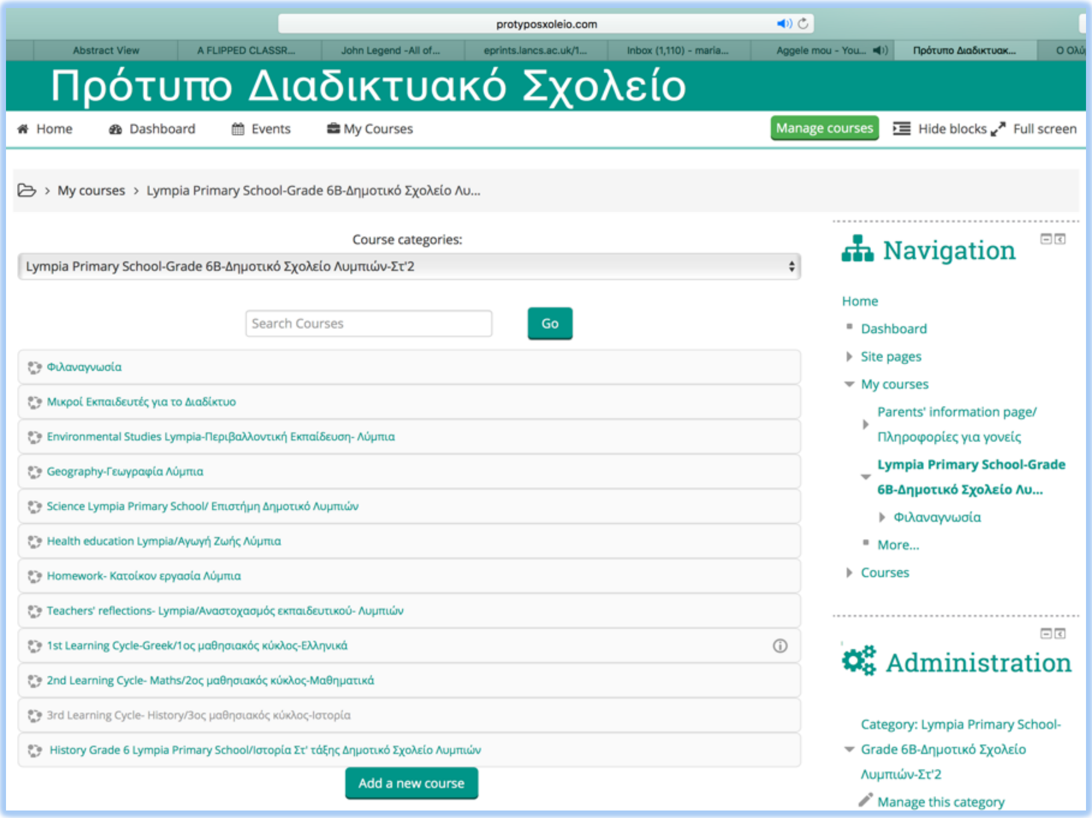


Figure 3.6. *Moodle pages for each subject (CS5)*

Each Moodle page includes a choice of Activities and Resources (see Figure 3.7) which could be used during lesson delivery. Activities included assignment upload (*Assignment*), online chats (*Chat*), a choice board for team creation (*Choice*), tools for database creation (*Database*), discussion forums (*Forum*), various traditional table games in online versions (*Game*), glossary creation (*Glossary*), lesson creation (*Lesson*), online quizzes (*Quiz*), online surveys (*Survey*), wiki creation (*Wiki*) and workshop management (*Workshop*). Resources included links for uploading books, files, folders, content packages, labels, photos and online paging.

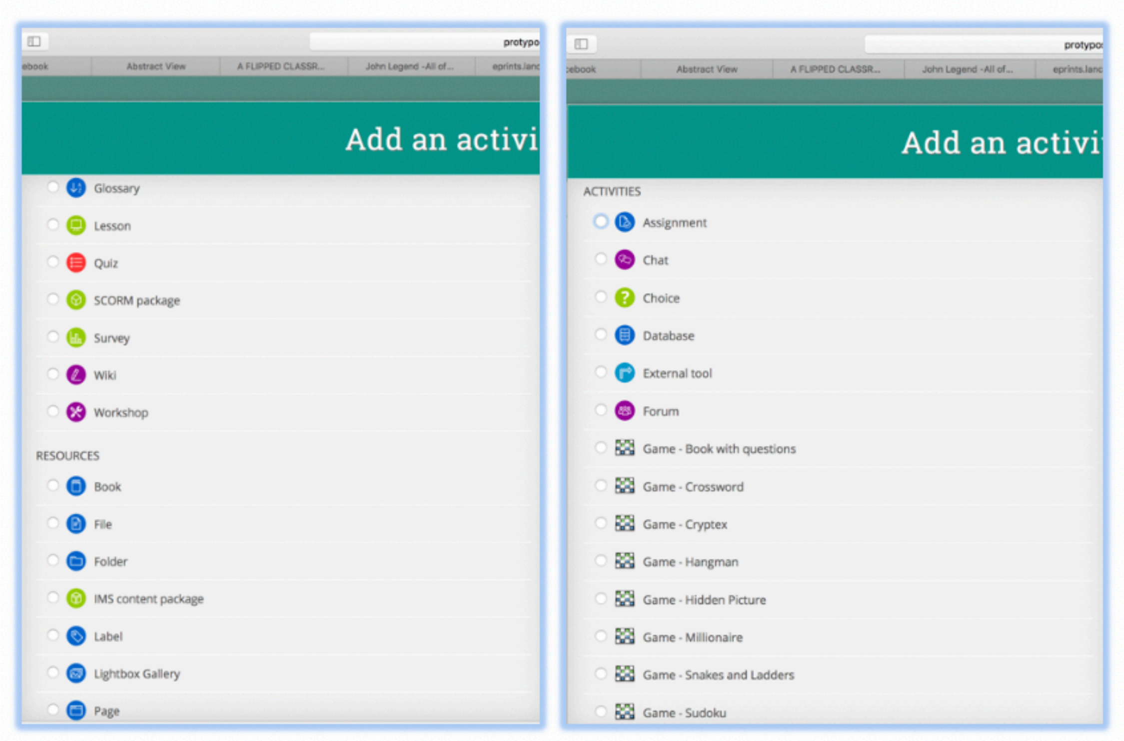


Figure 3.7. *Choice of Moodle activities or resource upload- Screenshots*

3.4 Research Methodology

3.4.1 Participants.

The research was carried out initially in eight different classes in six different public primary schools in Cyprus. One of the teachers taught to two different Grade 6 classes and another teacher taught to a mixed of Grade 3 and Grade 4 class. Therefore, six primary school teachers (one in each school) have been initially the participants of the research (4 females and 2 males), including myself, the researcher. Purposive sampling was used, hand-picking the teachers by mostly choosing '*knowledgeable people*' (Ball, 1990) in ICT (five out of six of them), i.e. teachers who were willing to implement the IB-FC instructional designs in their classroom and have prior experience or expertise in implementing TEL. The choice of an action research methodology also posed a limitation on which teachers to include as participants since these needed to be able to act and reflect throughout implementation as well as collaborate with each other. Again, good ICT skills have been essential even though this might cause a bias in the findings, given that the research aims to talk to mainstream teachers who wish to implement a FC methodology in their classrooms. Moreover, to be able to be part of an action research project, teachers had to follow the lesson template and the supports given (e.g. IB-FC tools, researcher support) so as to go through all of the four action-research phases as these have been explained in Figure 3.3. The teachers' willingness to adopt the methodology was also important during data collection since note taking and video-taping during classroom observations 'put them on the spot'. All participant teachers were also previously involved in other research projects and were very familiar with the process of preparing and delivering parents' seminars prior and/or during FC implementation.

Given the sample, the research began initially with six different case studies. Other research participants have been the students of each class and their parents. Parents' role was very important in the pre-class and post-class stage. Overall, 126 students and 60 parents agreed initially to participate in the research. However, there have been occasions when the parents gave consent for their children to participate in the research but they themselves were not willing or did not have the time to participate (n=7 out of 60). After the drop-out of CS6, explained n Chapter 4, 5 teachers, 77 students and 41 parents was the final research sample.

Information for each case study is presented in Table 3.2 below, giving information on school, students and teacher profile (pseudonyms used: *Tesa, Rosemary, James, Ben, Mary, Elisabeth*). The CS# abbreviation and pseudonyms will be used interchangeably for referring to teachers or their classrooms. One of the schools was rural (CS1) and very small in size. Three of them were urban (CS2, CS3, CS4) and big in size, especially CS2 and CS4. The other two schools were suburban (CS5 and CS6) and also large in size.

Students in CS1-CS4 and CS6 were familiar with the use of computers on a basic or good level but were not familiar with the Moodle platform which was used to facilitate the implementation of the IB-FC model. Therefore, classroom time was spent for Moodle tutorial sessions in getting students into their new role and responsibilities in line with the new teaching strategy.

Case Study	School profile		Students' profile			Teacher profile			
	Urban-Rural	*Total # students*	*Grade*	*# students in class*	*ICT competency*	*Age/ Gender*	*Years of teaching experience*	*Education*	*ICT competency*
CS1 **Tesa's classroom**	Rural	30	3 & 4 (mixed)	10	Basic*-Good	37 /F	15	BA Primary Education MA ICT & Education	Very good
CS2 **Rosemary's classroom**	Urban	280	3	19	Basic*	41/F	18	BA Primary Education. MA ICT & Education	Excellent
CS3 **James' classroom**	Urban	115	6	8	Basic*	40/M	15	BA Primary Education. BA Sociology. MA Educational Leadership	Very good
CS4 **Ben's classroom**	Urban	298	6	23	Good	41/M	18	BA Primary Education MA Curriculum & Instruction. PhD Information & Communication Systems	Excellent
CS5 **Mary's classroom**	Suburban	202	6	17	Very good (pilot CS)	37/F	15	BA Primary Education. MA ICT & Education. PhD candidate: E-Research and TEL	Excellent
CS6 **Elisabeth's classroom**	Suburban	249	6A & 6B	24 & 25= 49	Basic	45/F	23	BA Primary Education MA English Language Teaching	Good

Table 3.2. *Participants' profile (School, Student, Teacher)*

*Basic: Students know how to turn on/off their devices, connect them to the internet and use them for gaming.

3.4.2 Data collection.

The complex and dynamic nature of a multiple case-study methodology oblige an in-depth investigation of interactions of events, human relationships and other factors unique to each instance (Sturman, 1999). Thus, the aim is to portray '*what is like'* to be in a particular situation, capturing the '*thick description of participants*' live experiences, thoughts and feelings (Geertz, 1973). Whilst direct observations and interviews with participants are pertinent in case studies and used in combination (Cohen et al., 2011), they could not be the only sources of data since many case studies rely on mixed methods and a variety of data (Cohen et al., 2011). Many types of data, descriptive and detailed (Robson, 2002), subjective or objective (Dyer, 1995) are often employed. Yin (2009) identified '*six sources of evidence*' (p.101) for qualitative studies, some primary and some secondary, employed in this research:

(a) *Documents:* The learning IB-FC design reports/lesson plans and documents were uploaded on Moodle so the learning process and content could be accessible to students and were shared among all participant teachers. A total of 70 IB-FC lesson plans were created and shown in the examples of lesson plan analysis tables (see Appendix 3).

(b) *Archival records:* Educational Policy (MOEC, 2019a); TEL policy in Cyprus; Infrastructure management policy; Wi-Fi policy; BYOD initiative management policy (internal for each school).

(c) *Teacher Interviews and student focus groups:* In-depth focused semi-structured from teachers and students.

The five participant teachers were interviewed individually, and each interview lasted approximately 40 minutes. The teacher interview protocol (see Appendix 4) was divided into five parts: (a) Design of learning cycles, questions TA1-TA7 (e.g. TA5: *Which had been the main challenges in creating the learning designs/cycles*?); (b) Implementation of learning cycles, questions TB8-TB17 (e.g. TB9: *How was the pre-class material explained and/or communicated to the students*?; TB10: *What was the time limit given for the completion of the entrance-ticket*?); (c) Technical issues, questions TC18-TC21 (e.g. TC19: *How long did it usually take to prepare the flips and the material given*?); (d) Assessment, questions TD22-TD25 (e.g. TD23: *How were entrance tickets assessed*?); and, (e) Overall perceptions, questions TE26-TE29 (e.g. TE28: *Which had been the major challenges in the overall implementation of the model*?). The interviews were recorded, transcribed in Greek and translated into English.

All participant students (n=77) were separated into focus groups of 4-6, depending on the number of students in each case study. In Tesa's classroom, students in Grade 3 were interviewed separately from students in Grade 4. A total of eleven student focus groups were conducted from all five case studies and all data was recorded and transcribed in Greek, before translated into English. Each focus group lasted approximately 25-30 minutes. The focus groups were guided by a protocol (see Appendix 5) which was divided into four parts: (a) Pre-class, questions SA1-SA7 (e.g. SA1: *Which type of the uploaded material: videos, text, online sources, presentations etc., had been the most helpful in understanding the content and completing the entrance ticket*?)*;* (b) In-class, questions SB8-SB13 (e.g. SB9: *What happened if you haven't understood something at home or haven't completed the entrance ticket*?); (c) Post-class, questions SC14-SC18 (e.g. SC15: *How was the teacher helpful after the in-class session? Which means of communication were available*?; and, (d) Overall perceptions, questions SD19-SD20 (e.g. SD19: *Which skills do you think you have developed through this new way of learning? How was it helpful to you in any way*?).

(d) *Survey*: a qualitative survey was conducted among the participant parents (n=41) using open-ended questions. The survey was anonymously completed at home and returned back to school within a week. It was divided into the following four sections with a total of 15 questions (see Appendix 6): (i) Teaching-learning method, questions PA1-PA5 (e.g. PA4: *Did your child face any difficulties during his work at home (pre and post-class)? How did he deal with it*?); (ii) Parent involvement, questions PB6-PB9 (e.g. PB7: *In which way do you think you have contributed towards this new way of teaching*? *Did you like that or not?);* (iii) Technical aspects, questions PC10-PC11 (e.g. PC10: *Did your child had any problem with his device, internet connection software, applications at home? How did you deal with it*?); and, (iv) Overall perceptions, questions PD12-PD15 (e.g. PD15: *What do you think it* *could be done differently so that such a teaching method would have a better benefit for your child*?).

All 41 participant parents have completed the survey.

(e) *Classroom/lesson observations*: Classroom observations were recorded on camera (video and photos) and notes were also taken on the observation protocols (see Appendix 7). The main eight parameters of the protocol had been:

(i) Lesson information: School, teacher's name, date, time, learning cycle, subject, lesson code.

(ii) Orchestration Routines:

- Opening/closing lecture, particular review questions, assessment routines (question posing, format of written assessment).
- Support materials to students (chat rooms, online libraries, forums, presentations etc.).
- Question posing (how/when).
- Student notetaking (how/when).
- Activities in class (role rotation, interaction, poll system, stations etc.).
- *What if they don't watch the flip? What does the teacher do?*
- Access to videos (how).
- Use of entrance ticket (how it is used).
- In-flip (students watch the flip in class).

- Choice boards (giving choices to students).

(iii) Activities in class: Description of IBL or other activities and how they work/are facilitated.

(iv) Technology (devices, internet connection, applications/software):

- *Do students use the computer lab, school mobile devices or do they bring their own?*
- *Is there a good internet connection? How's the WiFi connection?*
- *Which apps/software are used?*

(v) Other tools: *Which other material are used?* (e.g. flashcards, worksheets, hands-on-tools).

(vi) Classroom (seating plan/arrangement, accessibility):

- Seating arrangement (*Is the arrangement set or does it change according to activities?* i.e. in pairs/in groups/on their own/as a class).
- *Is there a space to gather as a class (away from devices)?*

(vii) Teacher's role:

- All actions/reactions of the teacher in the different phases of the lesson (opening lecture, use of entrance ticket, inquiries administration, organizing/facilitating IBL process, assessment process, closing lecture, classroom management, crisis management, options given, rewards etc.).

(viii) Students' role:

- How students respond in the different phases of the lesson (opening lecture, presenting the entrance ticket, participation, communication, sharing of ideas, group management/work, internet use, creativity, process of IBL, competency to deal with content/technological tools, how do they communicate problems/needs to the teacher etc.), i.e. all actions/reactions of students.

A total of 30 lesson observations were made. Each lesson lasted approximately two teaching periods, i.e. a total of 80'. The observations were recorded in all case studies (including *Mary's* classroom) by a research assistant, a social-studies PhD student. Photos and video recordings served as complementary to notes taken and for cross check. All observation notes were translated into English.

(f) *Reflections and insights of each educator* on the '*Teacher's reflection page*' on Moodle were collected, even though teachers were not as consistent in answering the reflection questions (see Figure 3.8). Reflection questions focused on positive and negative aspects of the lesson. In particular, teachers had to describe the following: (1) *Two positive aspects of the lesson;* (2) *Two negative aspects of the lesson; and,* (3) *Two things you would have done differently in the lesson.* A total of 17 teacher reflections were recorded (*Tesa*: 6; *Rosemary*: 2, *James*: 1; *Ben*: 3 and *Mary*: 5).

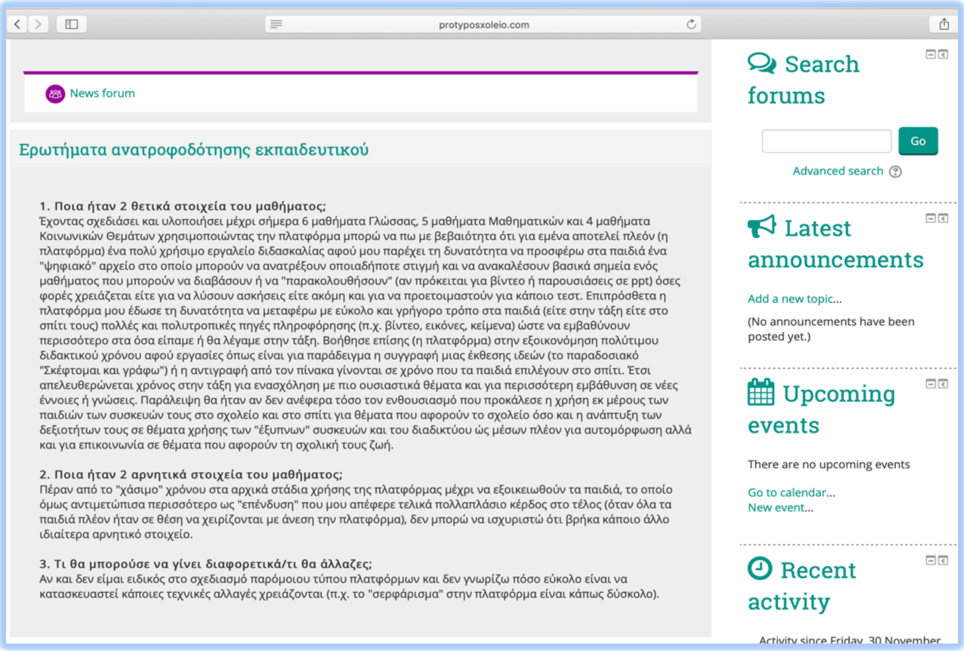


Figure 3.8. *Teacher Reflection Page (CS3)-Moodle screenshot*

Quantitative approaches have been excluded purely on logistical reasons given the importance in evaluating the real classroom dynamics through the investigation, collection and description of experiences and perceptions. The research is designed to gain better understanding of the FC methodology and hence it should have been exploratory. The view of respondents should be incorporated so as to ‘give them a voice’ (Kuna, 2012). One of the major differences between qualitative and quantitative methods is that in an attempt for precision and measurement, the latter hardly counts the meanings and interpretations of respondents scientifically relevant. Qualitative research on the other hand appreciates that multiple realities exist in natural contexts, and that the meanings and interpretations of those involved in interaction are important and key elements in accessing to these realities.

3.4.3 Data analysis.

Since this research aims to establishing UDPs through a multiple case study approach, it has been important to evaluate only common, typical and representative occurrences, ignoring infrequent and unrepresentative experiences, perceptions, events etc. Moreover, the significant *few* were separated from the insignificant *many* (Yin, 2009) so as to gain better insight into the common real dynamics of the IB-FC model implementation. A common set of criteria for interpreting the findings from each case study was needed so as to clearly indicate how each interpretation given is better than rival explanations (Yin, 2009).

Choosing from several approaches that could be appropriate for this kind of research, *thematic* analysis (Creswell, 2009) was the most suitable for looking at patterns, explanations, event analysis and cross-case analysis to reach interpretations and conclusions. Creswell (2009), in particular, suggested six different steps for maintaining thematic analysis. Step 1 was to organize and prepare the data for analysis. Step 2 was to read through all the data and reflect on the overall meaning, i.e. get a general thought about the main ideas arising. Step 3 was the coding process, segmenting data into categories and labelling them with an *in vivo* (based in the actual language of the participant) term and perform a preliminary analysis which might lead to recoding the existing data. During Step 4, the coding from Step 3 was used to generate themes or categories, interconnecting them into a narrative. Themes should then be analyzed for each case study and across them.

In Step 5, a detailed discussion of the themes was presented (qualitative narrative) with multiple perspectives from individuals including quotations, visuals, figures and/or tables. The final Step 6 involved the researcher's personal interpretations or meaning of the data depending on individual understanding, comparison with literature review findings and raising new questions that need to be asked for further research.

Nvivo, a qualitative research software, assisted in managing all the different data collected, following Creswell's Steps 1-4, walking through themes, nodes, patterns, flowcharts and key issues arising. Figure 3.9 illustrates an integrated data collection and analysis flowchart, embedded within the overall research framework. All measures were taken during data collection and analysis to keep the identity of participants anonymous. This includes the use of random code numbers instead of student names (e.g. S1.# for CS1, S2.# for CS2 etc.) and the same for the 41 parents (P1-P41).

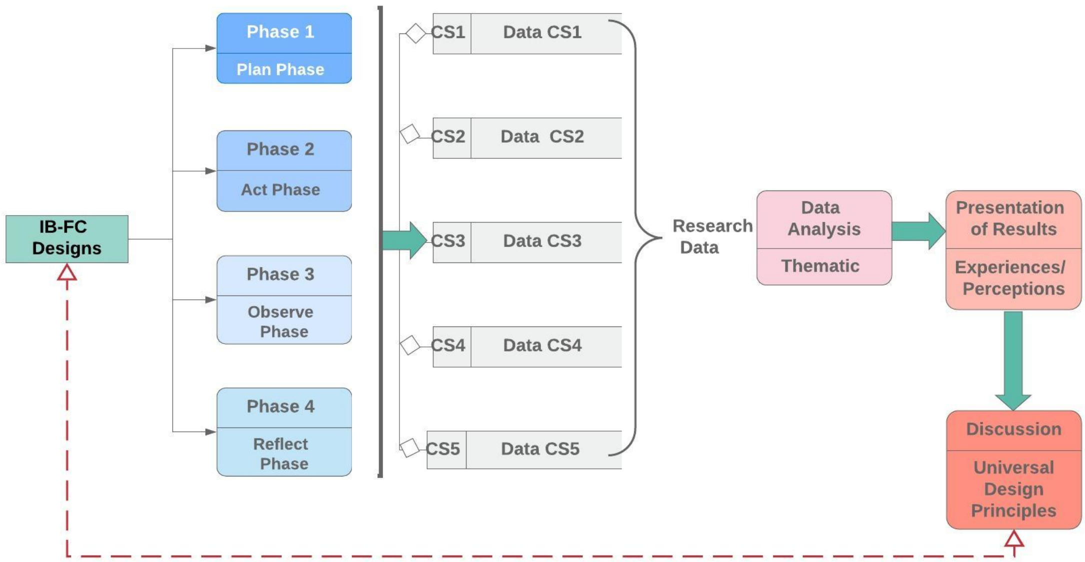


Figure 3.9. *Data collection and analysis flowchart*

In particular, the data analysis was divided into the following tasks:

(a) Translate notes into English, cross-check with classroom photos and video recordings from the lessons (making corrections/edits, additional data); Analyze in NVivo the classroom observations of each case study into the themes arising in line with protocol parameters: *after class, classroom-seating plan, digital tools, entrance tickets, flips, hardware technology, in-class activities, negative points-challenges, orchestration routines, other routines, other tools in class, positive notes, pre-class, principles, students, teacher role.* The NVivo visual (see Figure 3.10) is a representation of how observation protocols/notes of a particular school (CS1) fed into each theme (e.g. entrance ticket).

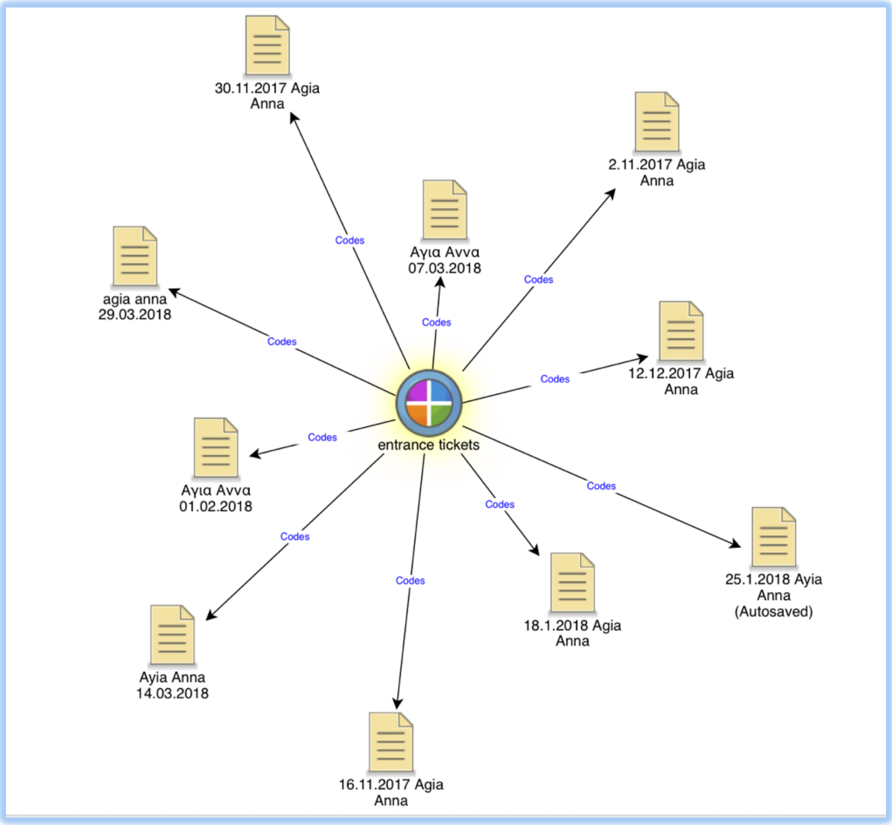


Figure 3.10. *A visual of entrance ticket theme in NVivo (CS1 Feeds: Observation notes)*

(b) Transcribe, translate into English and analyze in NVivo teacher interviews and student focus groups transcriptions, differentiating between experiences and perceptions. The following NVivo visual (see Figure 3.11) is a representation of how each theme (e.g. *students-dislikes*) was fed from data from all student focus groups (CS1-CS5).

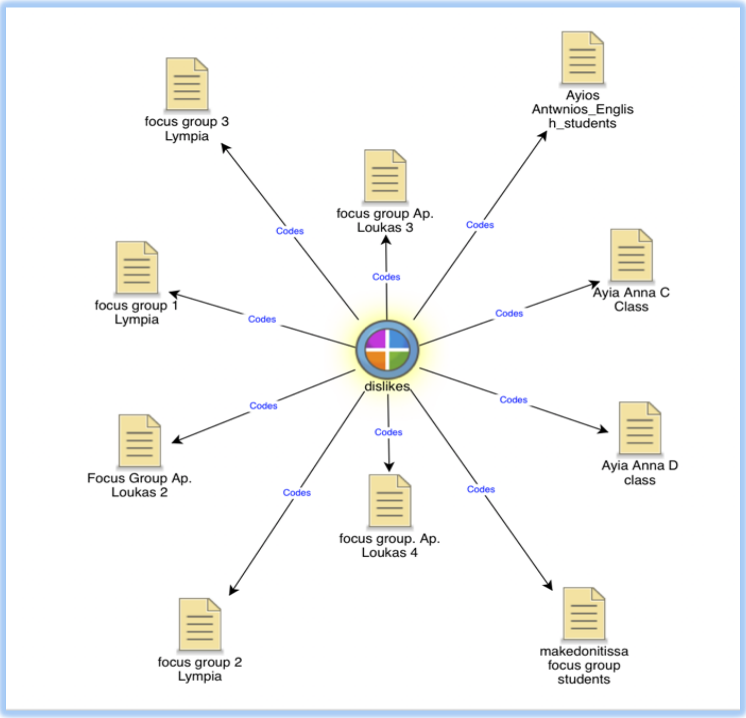


Figure 3.11. *Students' dislike theme in NVivo (Student focus groups CS1-CS5)*

Figure 3.12 is an example of an Nvivo visual of how each teachers' interview transcription had been analyzed into the various initial themes (see Table 3.3).

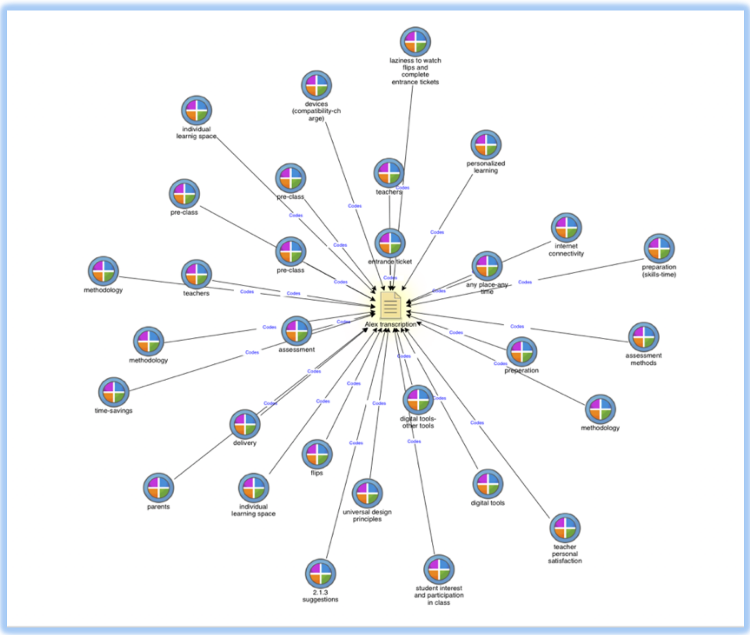


Figure 3.12. *Visual of teacher interview transcription (Ben) theme analysis*

(c) Parents' responses for each question in the survey were collected together and analyzed in Nvivo, differentiating again between experiences and perceptions.

The first three steps of data analyses gave rise to the detailed initial themes arising from teachers', students' and parents' experiences and perceptions and are summarized in Table 3.3 below.

(d) The final step was a lesson-plan analysis of all the materials uploaded on Moodle. This provided additional data for triangulation and cross-analysis of teachers' and students' experiences and perceptions, together with classroom observations and also fed the revision of the IB-FC tools. The analysis depended primarily on lesson template steps followed (Screenshots of lesson designs are available in Appendix 8).

These steps gave rise to the following themes, which were then transferred to a table of analysis, before creating equivalent figures to be used and discussed in the results section: *attracting students' interest, flip, entrance ticket, in-class IBL, after-class, assessment, Moodle, digital tools and orchestration.* A separate table of analysis was prepared for each subject in each case study (see Appendix 3).

After the final stage of analysis, the themes regarding teacher, student and parent experiences (RQ1) were grouped as pre-class, in-class and after-class, whereas teacher, student and parent perceptions (RQ2) were grouped into benefits and challenges with limitations.

Teacher experiences	Teacher perceptions	Student experiences	Student perceptions	Parent experiences	Parent perceptions

• Preparation
• Delivery
• Assessment
• Classroom management/orchestration routines
• Crisis management
	• **Benefits of IB-FC**
	  • Student interest and participation in class
	  • Personalized learning
	  • Time savings
	  • Lesson revision
	  • Any place/any time
	  • ICT skills development
	  • Assessment methods
	• **Challenges/limitations of IB-FC**
	  • ICT skills (students, teachers, parents)
	  • Laziness of students to watch the flips/complete entrance tickets
	  • Students disorientation
	  • Internet connectivity
	  • Devices (compatibility, charge)
	  • Preparation (skills/time)
	• **Suggestions**
	  • Individual/Group L.S
		• **Individual Learning Space**
		  • Pre-class (flips/entrance tickets/teacher and/or parent support/ feedback before lesson, challenges)
		  • After-class (assessment method, homework, revision)
		• **Group Learning Space (in-class)**
		  • Teacher support, peer support (activities, digital tools/other tools, orchestration routines)
			• What they liked about it (Likes)
			• What they didn't like about it (Dislikes)
			• Student time management
			• ICT skills
			• Suggestions
			  • Individual Learning Space (pre and after-class)
			  • Group Learning Space (in-class)
				• Homework space
				• Flips
				• Entrance tickets
				• Support (parental, teacher, peers)
				• Student time management
				• Challenges (connectivity, devices etc.)
				• Assessment
					• Parents' role
					• Benefits of IB-FC
					• Challenges/limitations of IB-FC
					• Suggestions (individual learning space)

Table 3.3. *Themes arising from teachers', students' and parents' experiences and perceptions*

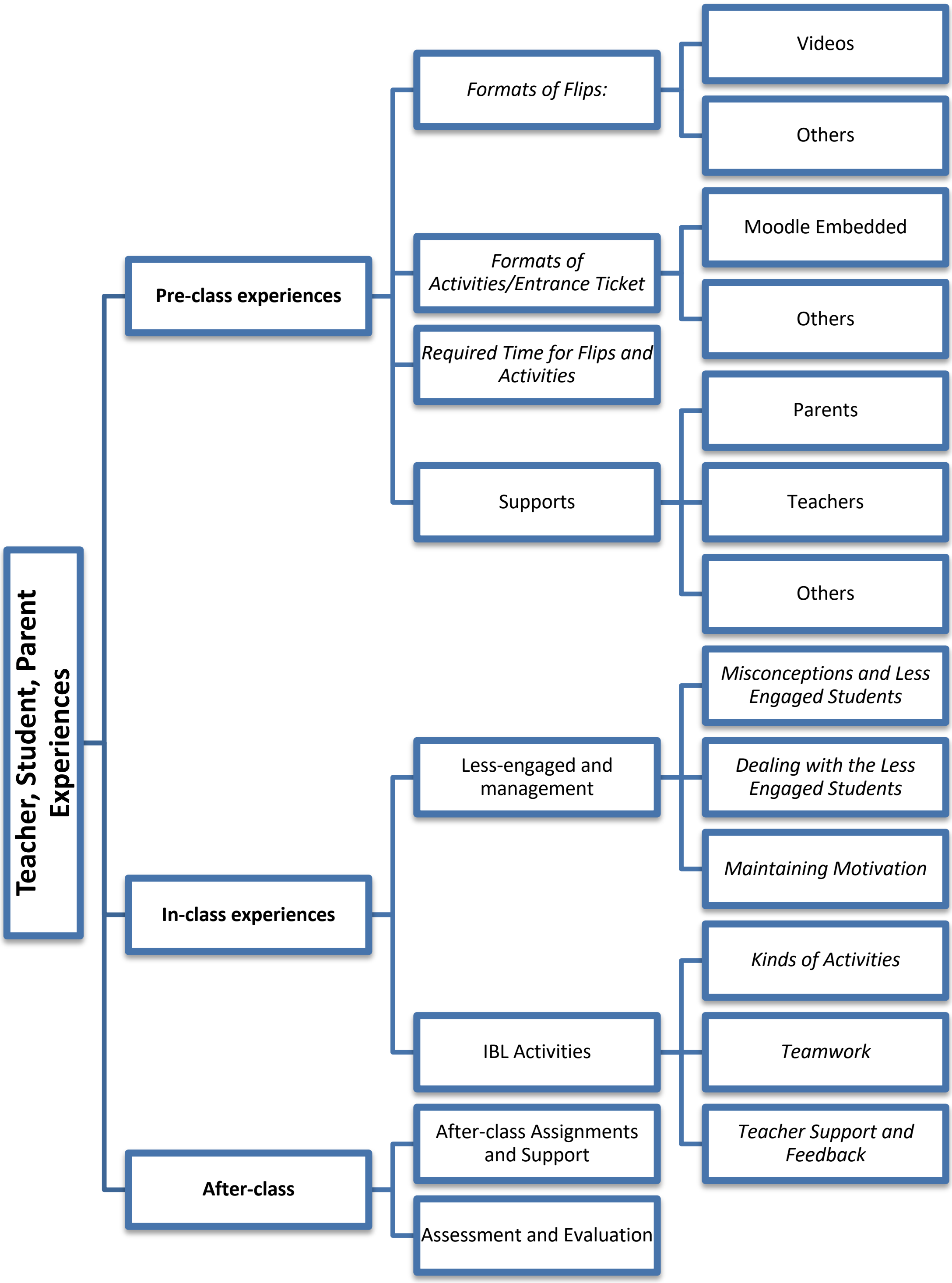


Figure 3.13. *Themes arising from all steps of data analysis- Teacher, student and parent experiences (RQ1)*

Figure 3.13 and Figure 3.14 summarize the final themes which will be used in Chapter 5 for the presentation of results. Universal principles (RQ3) which arise from the theme analysis of the data collected from each case study and the presentation of the research results for RQ1 and RQ2 will be discussed in Chapter 6 in line with previous research and relevant literature review.

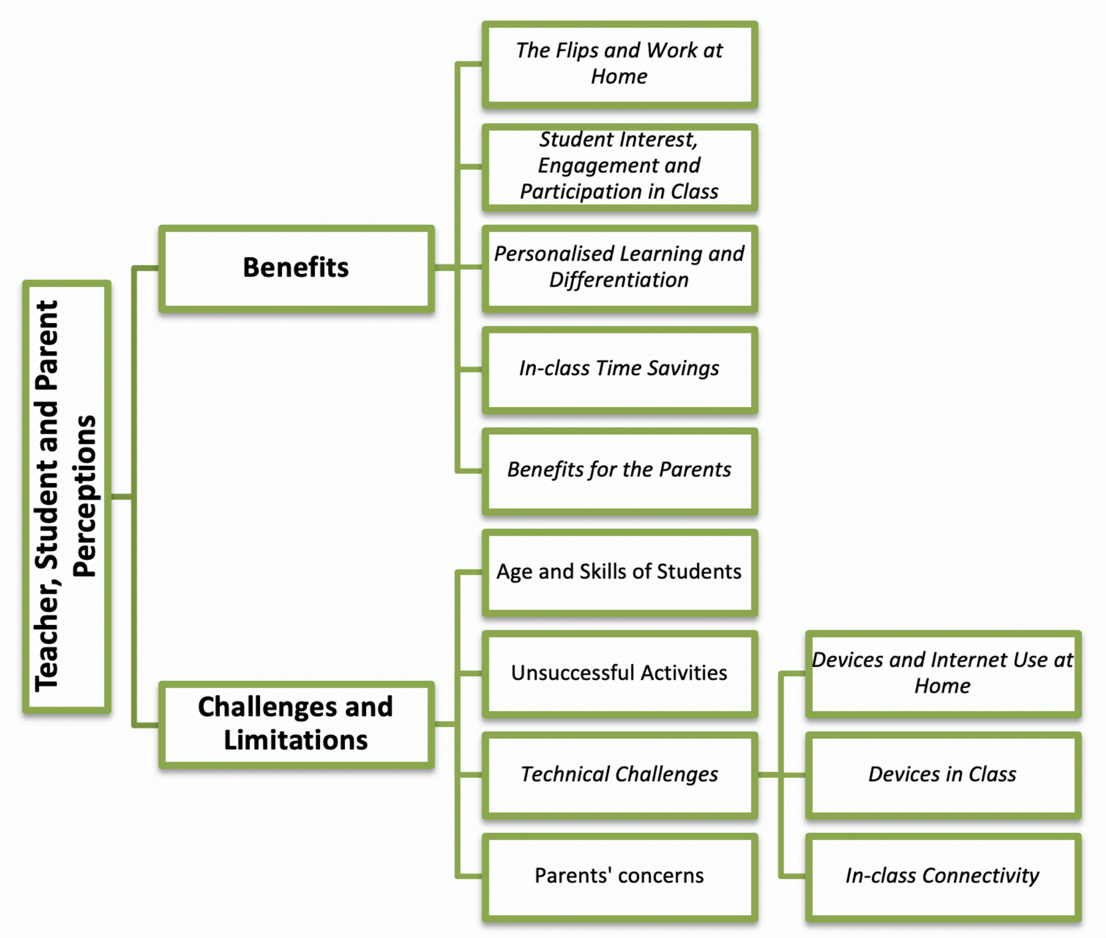


Figure 3.14. *Themes arising from all the steps of data analysis- Teacher, student and parent perceptions (RQ2)*

3.5 Ethical Concerns and Trustworthiness

Ethical concerns

Ethical approval for undertaking this research was granted initially from Lancaster University, allowing for the high-risk research since the students which took part were aged 8-12. Given that the research was carried out in public primary schools in Cyprus, ethical approval was also granted from MOEC through CCERE (see Appendix 9). In order to maintain the ethical approval from both institutions, all research data collection tools were prepared and made available, both in Greek and English, i.e. observation protocols, interview and focus groups protocols for all three groups of participants (teacher, parents and students). The research results will be made available to both institutions as well.

A clear initial statement of the research aims and research framework/model was then made available to all participants: teachers, parents, and students. All participants voluntarily signed the equivalent informed content and committed themselves into the responsibility of participating in all the phases of the research: Teachers (see Appendix 10); parents (see Appendix 11); and, students, signed by their parents (see Appendix, 12).

Trustworthiness

Multiple case studies in this research contributed to greater generalizability. In particular, '*analytic*' generalizability was maintained as the concern was not statistical (i.e. having a representative sample) but in how it could contribute to the expansion and generalization of theory (Verschuren, 2003), in this case the universal IB-FC design principles. Different forms of validity therefore needed to be maintained (Cohen et al, 2011), given that case studies do not have external checks or balances that other forms of research have. These have been: (a) *Construct validity*: accepted definitions of both models integrated for the IB-FC instructional designs were defined; (b) *Internal validity*: agreements were ensured between various parts of data through matching patterns, transparency, evidence-supported causal explanations and rival explanations were weighed-out; (c) *External validity* via context, theory and domain clarification; (d) *Concurrent validity*, e.g. triangulating data, perspectives, methodologies and instruments through the employment of various data collection tools; (e) *Ecological validity*, i.e. considering features specific to the context (e.g. network, student ICT skills); and, (f) *Avoidance of bias*.

Avoidance of researcher's bias was maintained through external viewers (Verschuren, 2003), especially during observations. In particular, a PhD student was employed as a research collaborator and was trained for making the recordings and observations of the lessons' delivery in all case studies, including Mary's classroom, where the educator was the researcher herself.

The use of a mixed methods research, i.e. employing multiple sources of evidence, also provided convergent and concurrent validity, i.e. the diverse data gave credibility, reliability and validity to each case study (Yin, 2009). However, this demanded an ability to handle and synthesize many kinds of data simultaneously (Johnson & Onwuegbuzie, 2004). Other limitations included what Shaughnessy et al. (2003) have suggested: the lack of high degree of control within case studies, especially in relation to extraneous variables, as '*treatments*' are rarely controlled systematically, e.g. learning designs developed. '*This makes it difficult to make inferences and draw cause and effect conclusions from case studies*' (Cohen et al., 2011, p.292), something that caused the write-up of UDPs very challenging. Moreover, the research is limited to the Cyprus context and generalizations will be given with caution.

Chapter 4: Research Implementation

In this chapter, details on research implementation will be given. In particular, the case studies will be presented in detail and the teachers' professional development prior to implementation will be explained. Details regarding parents' seminar, Moodle pages developed and the steps and tools adopted by the participant teachers for the IB-FC designs will also be cited.

4.1 Case Studies

The tables below describe each case study, focusing on: *the school, the teacher, other participants* (students, parents), *the infrastructure and the challenge.*

Case Study 1 (CS1), Tesa's classroom: rural, Grade 3 and Grade 4 mixed

The school

- *Tesa* (T1) works at a rural school in Larnaca (the smallest city in Cyprus). The school is very small with only 30 students so she has to work with Grade 3 and Grade 4 students in the same classroom. A separate Moodle page has been created for each classroom but all students are present in the same room during teaching. Given that, the two grades were considered a single case study.

The teacher

- *Tesa* is a very competent and enthusiastic teacher. She is very experienced in integrating ICT in her teaching. She has the necessary background knowledge (Masters' in '*ICT and Education*') and has participated in many ICT-integration projects. Minor guidance was given to her, even though it is the first time she would use the FC model in her teaching, given her ICT competence and experience. She feels very confident and it is a real pleasure for her to prepare the designs.

Other Participants

- The students have always been enthusiastic with the use of technology. It is the first time both the teacher and the students are using the Moodle platform though. *Tesa* had the same students last year so it was very easy for everyone (headmaster, students, parents) to accept this new methodology since they trust her as a teacher.

The infrastructure

- There is no computer lab at school but there are a few tablets available. Two students brought in their own tablets and two more tablets were provided by the researcher so that they all work on a 1:1 basis. There was good internet connection in class. All students, besides one, had a good internet connection also at home. That student would stay during *afternoon-school* and work.

The challenge

- Students from both classes were in the same room (Grade 3 and Grade 4) and shared the same teacher *(Tesa*).

Table 4.1. *Case Study 1- Description*

Case Study 2 (CS2), Rosemary's classroom: urban, Grade 3

The school

- *Rosemary* (T2) works at an urban school in Nicosia, the capital city of Cyprus. It has a very good reputation in terms of students' achievement levels. It is a large, well-equipped school with 280 students.

The teacher

- *Rosemary* is a very energetic teacher, involved in many national and international projects for ICT integration in education, collaborating with the European University Cyprus. She is also a very busy married mother with 4 young children. She stays overnight to prepare flips or find ready-made flips and design the IB-FC instruction. Due to her ICT competence and teaching experience, she did not need much guidance into the use of the Moodle platform, even though it was the first time for her.

Other Participants

- The headmaster and the parents know how hard-working *Rosemary* has always been and hence had been very positive for their children and themselves to participate in the research.

The infrastructure

- The school has enough tablets so that students can work on a 1:1 basis in class. There is poor connectivity in class so an extra router is needed to boost the network. All students have devices at home and good connectivity (most of them belong to families of high socioeconomic status).

The challenge

- The main problem in this case study is that *Rosemary* is very busy with all the projects she is involved in and only a few classroom observations were made possible.

Table 4.2. *Case Study 2- Description*

Case Study 3 (CS3), James' classroom: urban, Grade 6

The school

• *James* (T3) works at a neglected, poor urban school in Nicosia, an area where many foreign workers, refugees and immigrants live. Hence, the student population is very diversified, multi-cultured and speaking different languages. Locals (Greek Cypriots) avoid enrolment to the school for personal/racial reasons.

The teacher

• *James* is a very experienced and energetic teacher. He worked for eight years as the chief administrator of the *afternoon-school* sessions of public primary schools at MOEC. He has also been involved with the development of the New National Curriculum in Cyprus. Hence, he had the chance to study and practice in person the educational systems of different European countries. This has assisted him towards employing very innovative methodologies in his teaching, as he returned back to classroom teaching five years ago. He is married with no kids as his wife unfortunately suffers many health problems. He is therefore very committed to his work at school. He is always feeling very excited working with his students and aims to offer varying and interesting experiences to them. He always feels comfortable to alter the classroom's daily schedule in order to devote more time to IBL or in an attempt to adopt new methodologies. He was very positive from the very beginning in participating in the research and felt overwhelmed with the widened possibilities, especially through the Moodle platform and the instructional tools developed. He feels very confident in developing his own IB-FC lessons and needed very little guidance, even though he has no specialized ICT-integration skills or any real past experience. It was the first time he was using Moodle in his teaching and this has not caused him any stress, on the contrary.

Other Participants

• His students were few in number but of varying nationality. Parents had been very positive to participate as well as the students themselves.

The infrastructure

• The school had managed to buy 10 tablets from fund-raising events. These have been enough for working on a 1:1 basis in class. The students could take the school tablets at home for doing their work. Internet connectivity in class was good. All students, although of poor socioeconomic status, have a good internet connection at home.

The challenge

• Almost all students (n=7 out of 8) are foreigners and share language problems. Two of the students were taught in Greek for the first time during the year of research implementation (2017-18).

Table 4.3. *Case Study 3- Description*

Case Study 4 (CS4), Ben's classroom: urban, Grade 6

The school

- *Ben* (T4) works at a large urban school in Nicosia of an average standard. The school has no tradition in integrating latest technologies in the learning process.

The teacher

- *Ben* had been using Moodle in his teaching for many years now. He was familiar with the FC methodology, although he had never used it prior to his participation in this research. He is deeply involved in many ICT integration projects. He is the only one who has made some changes himself on the Moodle page (e.g. how new posts are shown) and has used multiple Moodle tools (e.g. Moodle quiz/crosswords). He did not need any particular guidance in preparing IB-FC lesson designs.

Other Participants

- The students had no prior experience in using technology as part of their learning in class. So, both parents and students were keen to participate in the research, given the good reputation of the teacher in integrating technology in his teaching. The school principal also trusted the teacher and gave his approval with no hesitation.

The infrastructure

- The school provided tablets to the students to work on a 1:1 basis and two of the students would bring in their own as well. There were some issues with internet connectivity in class and hence the teacher had to use an external router. All students had a device and a good internet access at home.

The challenge

- Ben began implementation after the first semester since he was busy completing his PhD thesis.

Table 4.4. *Case Study 4- Description*

Case Study 5 (CS5), Mary's classroom, suburban, Grade 6

The school
• *Mary* (T5) works at a large suburban school in Nicosia of an average standard.

The teacher
• *Mary* is the researcher and implemented the model during the same period as well. She had been working with all her students on a 1:1 basis since 2011, using a Moodle platform, and participating in many ICT integration projects. This had made it very easy for her to implement the model (since, being the researcher, she has read a lot about it compared to all other participant teachers), especially in orchestrating in-class implementation since she can easily anticipate what can go right or wrong. She had implemented the model on a pilot basis during the school year 2016-17, with the same students.

Other Participants
• *Mary's* students worked with her through a BYOD initiative the previous school year as well (in Grade 5). These students, therefore, were very familiar with VLEs, such as Moodle and Mahara, since they were also involved in many ICT projects the previous year (e.g. ATS2020). They have also been the participants of the pilot implementation of this research. Their ICT skills are therefore very good.

The infrastructure
• There is no computer lab or any tablets available at the school. So *Mary* works on a 'Bring Your Own Device' initiative, giving out the two school laptops to students who did not have a device. Hence, all students had a device to work with, both in class and at home. Internet connectivity in class was very good since it was boosted with a WiFi router. All students had a good internet connection at home.

The challenge
• The BYOD initiative. The Moodle platform works on any device and this is what kept the BYOD challenges to the minimum.

Table 4.5. Case Study 5- Description

Case Study 6- Elizabeth's classroom: Dropped Case Study, suburban, Grade 6A and 6B

The school

- Elizabeth (T6) works at a large suburban school in Limassol, the second biggest city in Cyprus. The school is considered to be of an average student achievement standard.

The teacher

- Elizabeth had good ICT skills but the least experience in ICT integration programs, compared to the other participant teachers. She felt though very enthusiastic about the model but needed guidance in using Moodle and designing the IB-FC lessons. She was only teaching the English Language lesson to the participant students and she was not the classroom teacher for any of the two groups.

Other Participants

- The students were using technology in the lesson for the first time. There was a lot of skepticism from the headteacher in agreeing to the teacher participating in the research. There was some skepticism among the parents as well. Hence, not many parents agreed to participate themselves. Almost all of them though agreed for their children to participate.

The infrastructure

- There was a computer lab at school which could be used. There were not enough devices to make sure there was a 1:1 implementation. There was internet connectivity at the computer lab but not a good wifi connection, neither at the computer lab or in the students' classroom.

Table 4.6. *Case Study 6- Description*

Given all of the above information, each school is considered a different case study, although they all follow the same National Curriculum for Primary Education and share a good ICT infrastructure. Particularly, a 'case' in this study is defined in terms of the educational designer who would follow the IB-FC model implementation, i.e. the educator. Each educator differs in prior knowledge and experience in ICT integration and also has a self-established teaching methodology which merely acts as a barrier to anything new. Hence, Tesa's Grade 3 and Grade 4 students are considered a single case-study since they share the same teacher who makes the difference in the design and delivery of the IB-FC instruction. The same for the two English classes Elisabeth was teaching to. Hence, given that each participant teacher worked in a different school, each school has been regarded as a different case study.

The challenge and the drop-out:

Two months after implementation began, *Elizabeth* dropped out of the research due to connectivity, device, discipline and student disengagement issues. *Elizabeth* talked of how hard it was for her to orchestrate the lesson, given that she was not the classroom teacher of the participant students and she would only meet with them twice a week (two teaching periods, 2X40', each group of students, Grade 6A and 6B). This did not help the students or the teachers (the participant teacher and the class teacher who could make sure the students are on task at home) in sharing continuity and be consistent for the implementation of the research. The students either forgot to watch the flips or were not responsible enough to carry out the assigned pre-class or after-class work (most of them claimed they did not have device and connectivity problems at home). According to the teacher and the classroom observations, only a few of them would manage to complete the entrance ticket and keep up with the classroom pace back in-class. Therefore, there was no saving in classroom time, but the contrary, given the low ICT skills of the students as well.

Other challenges have been the connectivity issues in class, so the school computer lab had to be used which was not always available. This led to the teacher in giving a chance to a BYOD trial, borrowing a WiFi router from the researcher to be used in the students' class. That did not work neither, since the students would bring in their devices and use them for everything else but the lesson, given their behavior problems. *Elisabeth* decided to withdraw from the research on the day she caught the students using their devices for taking photos of other teachers whilst teaching in class. She felt that she could not control their behavior, or control the use of devices since some students would hide them in their bag and not hand them to their teacher in the morning. She also could not continue holding back on the curriculum goals for the sake of the model's implementation, as its benefits were not realized with the particular group of students (Grade 6A and 6B together). Her head-teacher haven't been very supportive from the beginning as well.

Elizabeth's classroom had many implications for establishing the UDPs of the model's implementation. These will be discussed later in Chapter 6. For the results' analysis, only the five remaining teachers were considered as the final sample of the research, comprising of five different case studies, with 77 students (see Table 3.2) and 41 parents. These teachers have implemented the model for a whole school year (not only for two months in *Elizabeth's* case) and hence it would only be valid to include their experiences and perceptions.

4.2 Teachers' Professional Development (TPD)

4.2.1 Research presentation.

The first step was to explain the aim of the research to the teachers, illustrate the FC model in contrast to the traditional model and guide along the skills developed though an IBL methodology in class, i.e. presentation of the IB-FC model. The technology needed was also explained, along with the stages of the research implementation (parents' and students' consent forms, lesson designs, teaching process, data collection tools etc.). The commitment and the responsibilities of the teachers as participants were also described. A Power Point research presentation was prepared (https://tinyurl.com/y7cey7yh) (see Appendix 13), along with a video (https://www.youtube.com/watch?v=kzvDNGT1SLs), clarifying all of the above. The Research Information Sheet was also shared. Both documents are available on the Moodle Home page.

4.2.2 IB-FC tools.

According to the research framework and successful tools recognized through the literature review, different IB-FC tools were developed to guide the teachers towards the design of the IB-FC lessons. These include suggestions for the various stages of implementation, as well as recommendations on the orchestration routines and digital tools which could be used. In particular, six different IB-FC tools had been developed:

(i) *Pre-class tool*: A1: Advice on the *Readings* (e.g. How much?; Promoting IBL; Note-taking); A2: Videos (e.g. Short; Teacher-created; Content-based); and, A3: Assessment during pre-class (e.g. Quizzes; Presentations; Reflection/Discussion online communities).

(ii) *In-class*: Advice on the kind of activities which could be organized in-class (besides the specialized IBL activities), ranging from B1-B11. E.g. Creative group work; Practical applications; Mini lectures; Sharing self-created videos or notes.

(iii) *Digital-tools*: Options on different tools which can be used for orchestration and storage (C1), creating videos/flips/screencasting (C2), customize ready videos (C3), ready videos (C4), creating presentations (C5), whiteboard apps (C6), management tools (C7), other content creation tools (C8).

(iv) *Orchestration routines*: Options on in-class process (D1), support materials to students (D2), question posing (D3), notetaking (D4), activities in-class (D5), other orchestration routines (D6).

(v) *Entrance/exit tickets*: Kinds of activities for entrance tickets (E1) (E.g. Take notes; Question posing; Post Comments; Mind-maps) and exit tickets (E2) (E.g. E-portfolio; Content creation; Teacher interviews).

(vi) *IB-FC in class*: Options on specialized in-class IB-FC activities (F1-F12), E.g. Challenge problems and research; Simulations; Robotics; Expert calls.

Each tool is visualized in figure form, summarizing its parameters and examples and is accompanied with a descriptive document explaining each parameter of every tool for assisting teachers further (see Appendix 2; https://tinyurl.com/y3ta689g). These detailed guides for each IB-FC tool are also available on the blog created for the research (https://flippedclassroomcyprus.blogspot.com/p/instructional-tools.html). The IB-FC tools are also uploaded in the equivalent space on the Teacher's page on Moodle, both in Greek and English (see Figure 4.1 for an example).

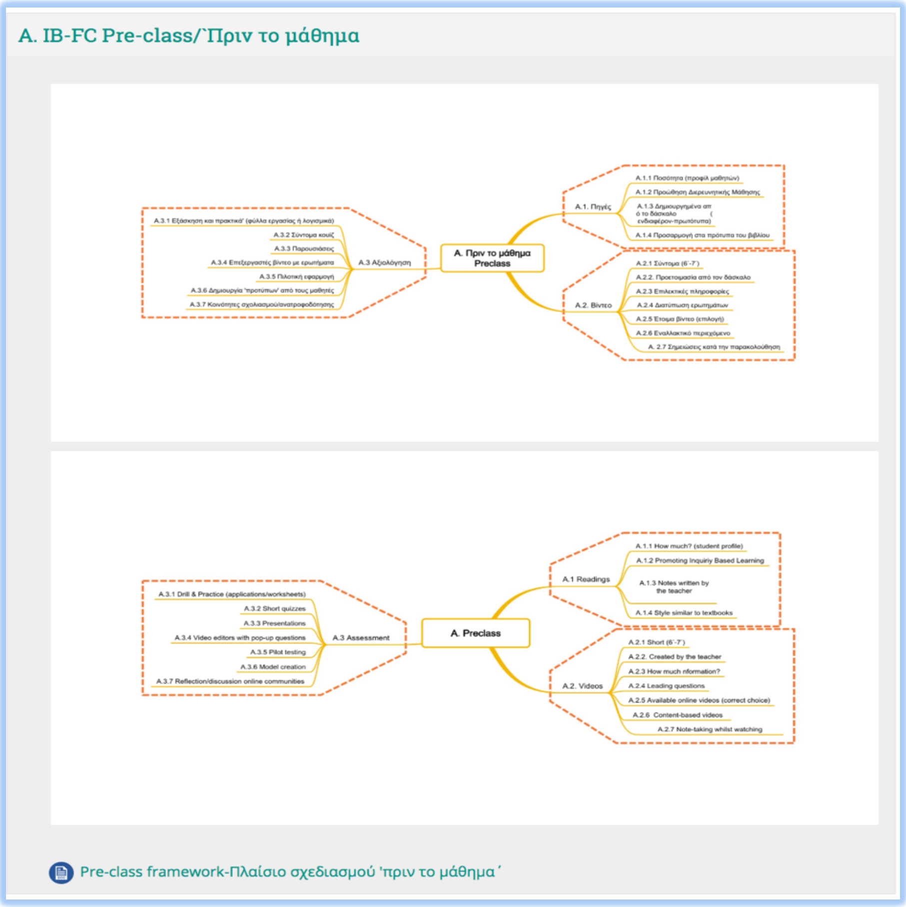


Figure 4.1. *IB-FC pre-class tool on Moodle (Greek and English)- Screenshot*

The selection of the digital tools was made according to tested tools in FC literature (see Section 2.2.1), divided mainly between the use of screencasting software, such as Echo360 Classroom Capture (McLaughlin et al., 2013) and

Camtasia (Kong, 2014), as well as online screencasting tools, such as Screencast-o-matic (Talley & Scherer, 2013). Other categories of digital tools have been software for creating presentations, online (e.g. Google Slides) or desktop learning suites, such as 365 Microsoft suite in the research of Hung (2015). Whilst selecting whiteboard apps and management tools, it has been difficult to decide which are the most user-friendly in past research since they refer more to FC orchestration rather than FC instruction. Hence, past research has not clearly defined the way teachers have responded to each (Enfield, 2013). Therefore, various options have been given to participant teachers through the IB-FC Digital tool so that they could personally decide which is more effective for their group of students.

4.2.3 Moodle Teacher's Page.

A separate Moodle page was created to assist the teachers for the IB-FC research implementation, e.g. the IB-FC lesson designs. The Teachers' Page on Moodle included the following list of items, as shown on the Moodle screenshot (see Figure 4.2).

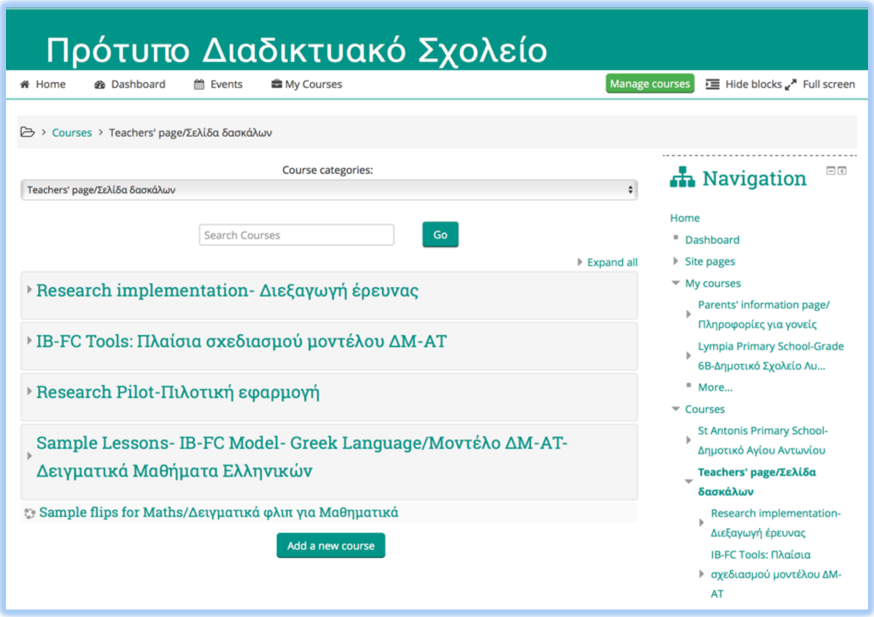


Figure 4.2. *Moodle pages on Teachers' Page*

(i) Research Implementation: (a) *What is FC*: there was uploaded information on the FC model together with reasons why you should flip your classroom (see Figure 4.3) (b) *Information sheets and consent forms:* the research license from Lancaster University and MOEC, all information sheets, teacher, student and parent consent forms, interview and investigation protocols, were uploaded for easy access (see Figure 4.4) (c) *Articles/references:* useful scientific publications on FC or IBL were shared.

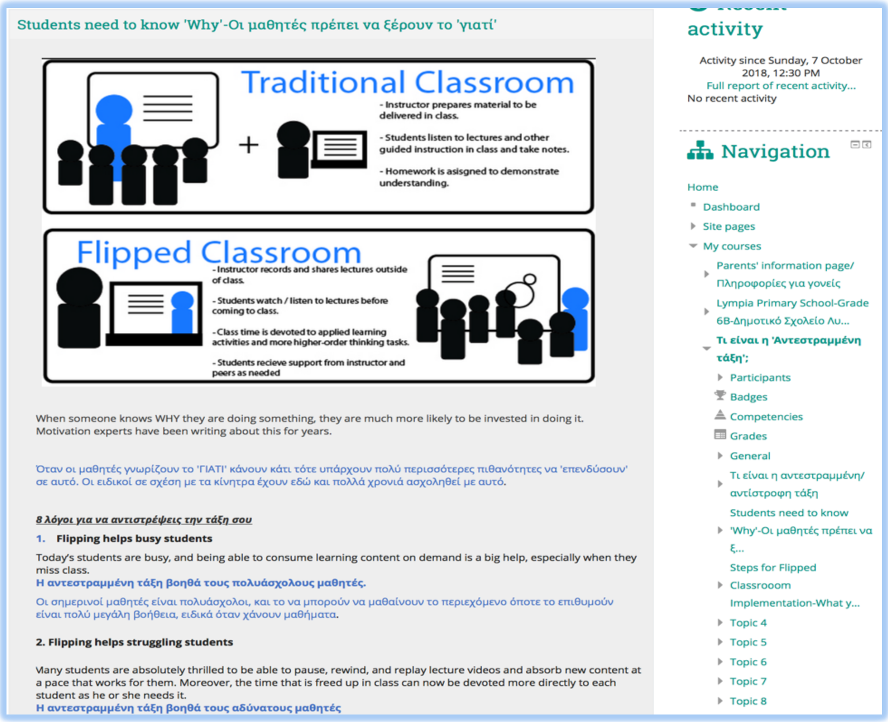


Figure 4.3. *Teachers' Page: What Is flipped classroom?*

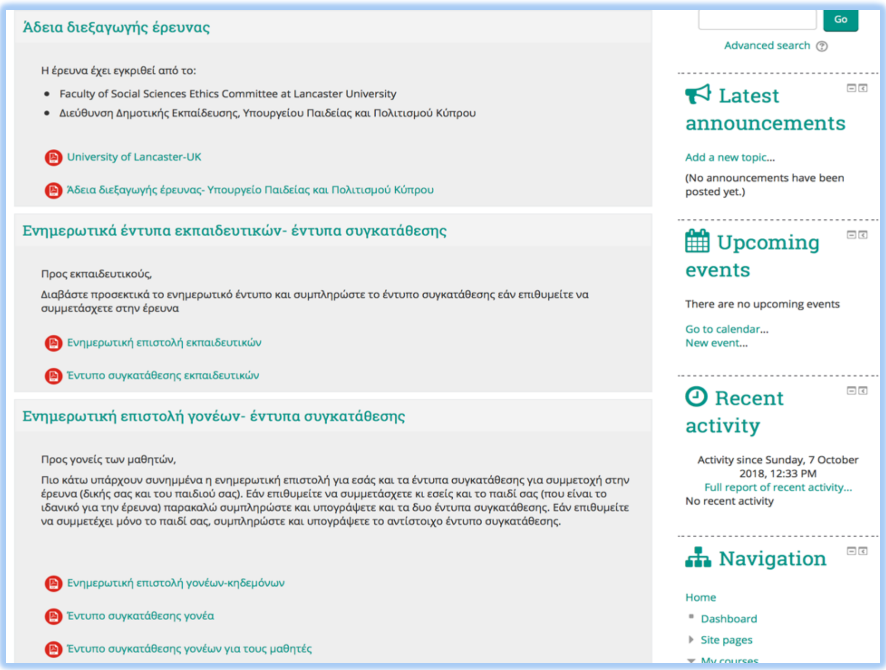


Figure 4.4. *Teachers' Page: Information sheets and consent forms*

(ii) IB-FC Tools: (a) Illustration of *IB-FC tools* and analytical description of each parameter (see previous section); (b) *Useful websites* on the flipped learning initiative were also uploaded (e.g. http://flglobal.org/communityhome/) and teachers were given the option to become members in flipped learning communities (e.g. https://flippedlearning.orseg) or blogs, especially in relation to FL in primary education (e.g. http://flippedclass.com/flipping-the-elementary-classroom/) (see Figure 4.5).

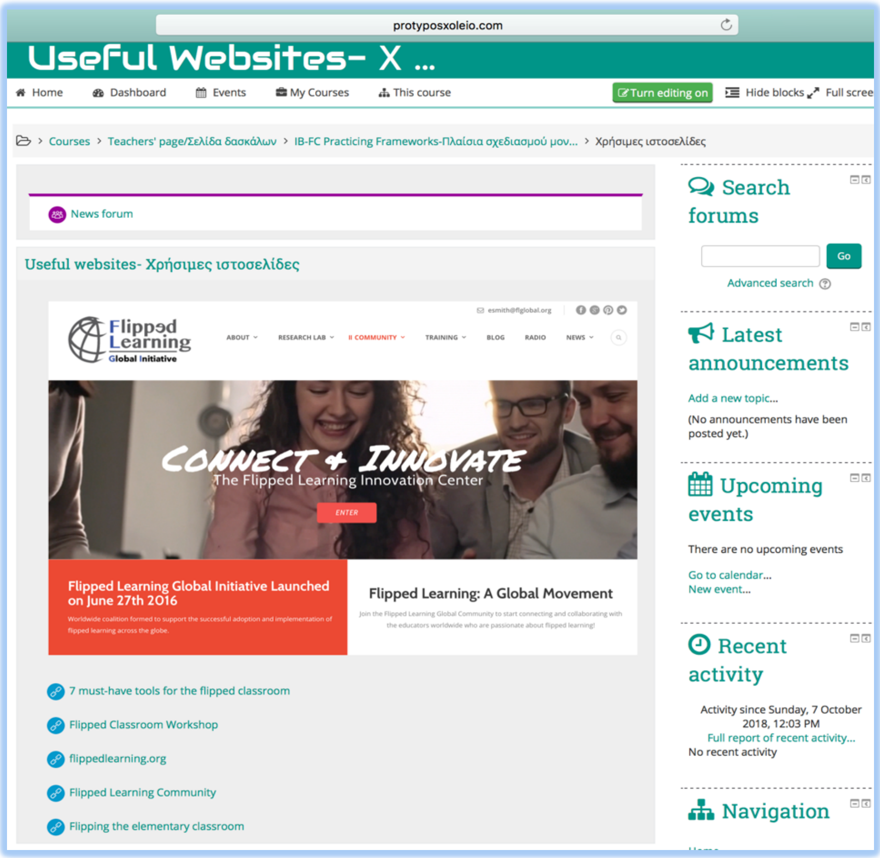


Figure 4.5. *Websites and supports given to teachers (Moodle Teacher's Page)*

(iii) Research Pilot: An IB-FC lesson from the research pilot was uploaded (Grade 5- Geography), with details on the design and the actual stages followed (see Figure 4.6). The lesson setting on Moodle was a copy of the actual lesson taught through the Mahara platform which was used for the pilot part of the study, including the equivalent Moodle tools which could be used.

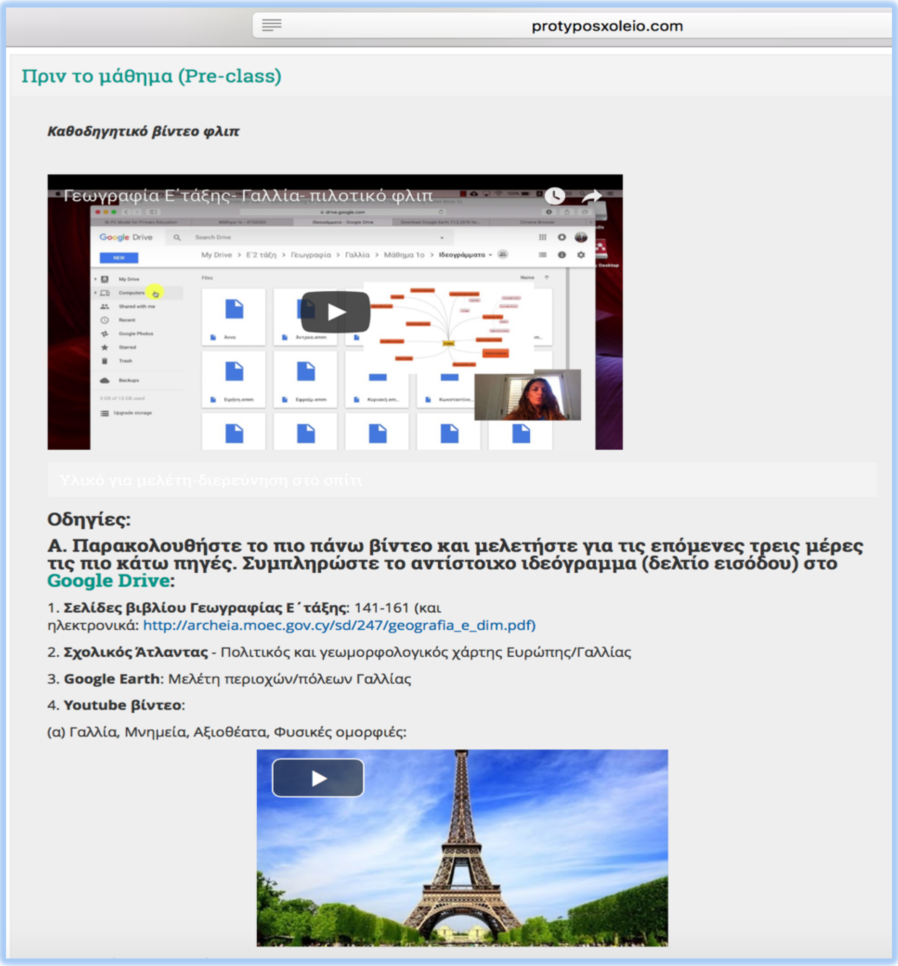


Figure 4.6. *Pilot design on Moodle- Screenshot*

(iv) Sample lessons IB-FC model: (a) *Lesson template*: A simple lesson template was developed (see Table 4.1) with all the steps of the IB-FC design (Introductory in-class, pre-class, in-class, after-class), important notes for the teachers and the research framework. The aim of the template was to assist the teachers in their initial development of the IB-FC lessons, making sure they follow the correct structure which they could gradually evolve themselves; (b) *Flip examples*: Further examples of flips were given to teachers for preparing their own lessons.

A. Introductory in-class session (10')
• Attract students' attention. Set the scene for the resources and content given for study at home.
B. Pre-class, i.e. at home ("day- work", do not use the word '*homework*')
• Video/flip (5'-10') and/or presentation and other sources/notes for reading/studying. • Optional: Upload further sources on Moodle or simply print up a short notes sheet with a quick response (QR) code on the top. Forum on Moodle for note taking, summarizing, writing up the learning goal, answering questions, suggestions for in-class activities (e.g. What do you think we should process further?), share of entrance tickets etc. • Teacher help: Available online chat for questions (optional/preset time) • Assessment: Entrance ticket, e.g. quizzes, mindmaps, worksheets, polling system (to be uploaded on Moodle).
C. In-class
• Lecture (5-10'): answering questions, looking at forums, notes, filling-in the gaps, clear misconceptions. • Inquiry-based learning: guided and independent practice e.g. students research and create content using entrance ticket and other sources (upload on Moodle or Drive or e-portfolio). • Identify which students need help • Review questions • Exit ticket or Assessment/self-assessment/peer-assessment: survey, worksheet, rubrics etc. • Closing lecture (5-10')
D. After class
• Ask them to re-watch the video or a new flip in closing the lesson at home. • Completion of e-portfolio: prepare the final page or the e-portfolio with their reflection on the unit, incorporating learning evidence.

Table 4.7. *Initial IB-FC lesson template*

4.3 Parents' Seminar

4.3.1 Research presentation.

Parents were gathered during afternoon meetings at each school where the researcher, together with the participant teacher, explained the aim of the research, illustrated a simplified version of the IB-FC model and outlined the benefits for parents and their children in participating in the research. There was emphasis on the technology needed at home and the parents' role during the pre-class session. The data collection methods were also presented as well as the responsibilities of each part during the research (e.g. interviews, classroom investigations). The Power Point research presentation, which was prepared for parents (see Appendix 13), clarified all of the above.

4.3.2 Moodle Parents' Page.

The Moodle Parents' Page was created and included in the research video for a quick update on the research aim and implementation. The Research Information Sheet, the Parents' consent form, and the Parents' consent form for their children were also shared. A useful link which described '*Five Reasons Parents Should be Thrilled their Child is in a Flipped Class*' was also added. The page also included a parents' forum for communicating any inquiries to the researcher or the teacher of their children concerning any of the stages of the research implementation (see Figure 4.7)

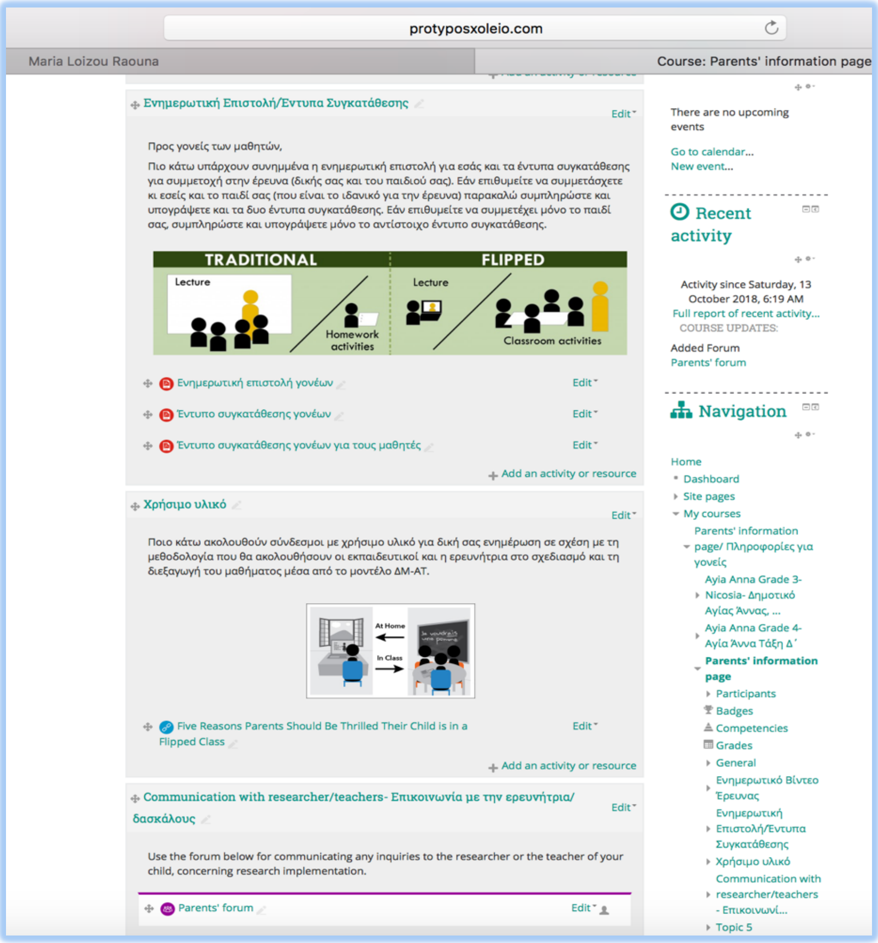


Figure 4.7. *Moodle Parents' Page*

4.4 Research Implementation/ Educational Design

4.4.1 The design proccess.

Even though participant teachers have not been experienced but only in theory informed about the IB-FC approach (see Section 4.2), they have been asked to develop their own material, in collaboration with the researcher, in order to be able to look at the real challenges of the approach at every stage of the lesson. Particularly, it was considered important that to have a look at how mainstream, untrained teachers would respond to the design of their own IB-FC instructions, looking at all of the following: (a) What was actually needed of them in terms of technology skills and personal time for developing the flips, the entrance ticket, the IBL activities and the feedback given; (b) How useful the VLE was in terms of offering the structure and the flexibility in using its incorporated activities; (c) How the lesson template given was useful (Figure 4.1) and whether they could follow it; and, (d) How useful had been the IB-FC tools in offering a choice for the lesson designs. Therefore, the experiences and perceptions of inexperienced teachers were bound to give a more clear view of how any group of educators is likely to respond to such a teaching methodology and thus what kind of UDPs will make the process easier and potentially effective, even though a more specialised TPD should be pursued.

Figure 4.8 illustrates the common actions and steps of the teachers described as their daily routine in designing the IB-FC instructions. The first step was to clarify the learning goals of the lesson (in line with the National Curriculum) and then '… *break the content of the lesson in pieces so every piece will respond to a specific period, so the students can have material to respond to those learning goals of the specific unit*' (*Ben*). The stimulus of the lesson was then chosen and uploaded on Moodle, followed by the development of the flip (or using a ready-made online flip) and the entrance ticket. The in-class activities were primarily selected '…*according to Moodle tools available…I had a look at them before deciding'* (*James*), whilst extra IBL activities were '*a must'* (*Ben*).

The exit ticket followed, which *Tesa* noted as something more relaxing to end the lesson, e.g. '*I would upload at the end of the lesson something more playful and more interesting for the students, maybe a relevant game/cartoon video*' (*Tesa*).

- Set up of learning goals and aims
- Break up of content into periods
- Upload of lesson's stimulus on the platform
- Development of material or use of ready-made flips
- Creation and upload of the entrance ticket
- Use of Moodle tools for activity development
- Extra IBL activities- lesson extension
- Preperation and upload of exit ticket

Figure 4.8. *Steps for the design of IB-FC instructions*

Although all teachers followed the same steps for designing the IB-FC lesson plans, there have been variations in the actual implementation. In the Tables included in Appendix 8, a lesson analysis into the different stages of implementation is illustrated for each case study, differentiating between: (i) attracting students' interest; (ii) flip; (iii) entrance ticket; (iv) in-class IBL; (v) after-class; (vi) assessment; (vi) Moodle use; (vii) digital tools; and, (viii) orchestration routine. This analysis gives a clearer view of each case study, adding to the details given above (see Tables 4.1- 4.6).

4.4.2 The tools.

The IB-FC tools

It had been evident from the lesson analysis that many of the suggestions within the IB-FC tools were used by the teachers in preparing their lesson plans, e.g. the digital tools for preparing the flips, orchestration routines for sharing students' work (e.g. online drives), options for IBL activities etc. Obviously, as implementation proceeded, teachers needed the tools less: e.g. '*Ok, in the beginning I was using them, but after 2-3 times I would do it more independently. I had a look at them though yes'* (*Rosemary*).

The digital tools

Table 4.8 includes a brief description of each of the most widely used digital tools and in which case study each has been used. In general, Moodle activities/tools have been widely used and a common Google account for each class/case study was created and assisted towards orchestration. The use of Google Docs and Slides was very common practice as it allowed simultaneous editing, unlike Moodle wikis, and therefore enhanced group work. The Google account that supplemented Office 365, was not installed on all devices and gave the option to the students to work online for free. Moreover, the digital tools for creating the flips were Screen-O-Matic and Camtasia, both sharing similar features: screencasting, live-camera window, highlighters and arrow options, speech balloons and many other annotations (see subsection 'Flips'). Camtasia is a more professional software with extra features, such as multiple screens, but it is not open source. It was therefore only used in *Mary's* classroom.

In-class creative assignments included the use of many other applications and software, not included in Table 4.8, such as Voki (avatar creation), Glogster (interactive poster creation), Wordle (cloud words), Purpose Games (online game creation), Scratch (programming language-robotics) etc.

Mahara has been used extensively and successfully in *Mary's* classroom as an e-portfolio platform. The final portfolio took the form of the lesson's exit ticket and/or substituted a traditional test for further assessment purposes.

Tool	Use	Case study
Moodle Forums	Creating discussion threads: Used for answering questions, commenting, posting drafts or final work, self and peer assessment.	CS1, CS2, CS3, CS4, CS5
Moodle Chats	Real time discussion: Students discussed a certain topic (entrance ticket) or used it for note-taking during group work.	CS1, CS2, CS5
Moodle wikis	Collaborative creation of text, lists etc. It did not allow multiple users at the same time. It was used for afternoon work only.	CS1, CS3, CS4, CS5
Moodle Quiz	Creating questions such as multiple choice, short-answers, true/false. Used as entrance or exit ticket and assessment of in-class work.	CS3, CS4, CS5
Moodle Glossary	A glossary is created in alphabetical order by creating new entries. Used for new concepts/words (vocabulary lists) and links/multimedia were also added.	CS1, CS3, CS5
LightBox Gallery	Students comment on photos. The teacher used photos as a flip in the place of a video.	CS4
Moodle Games	Creating interactive games. Used for text comprehension and more depth in building new vocabulary.	CS4, CS5
Moodle badges	Student reward for promoting motivation and engagement.	CS4
Screencast O' Matic/Camtasia	Flip creation.	CS1, CS2, CS5
Drill & Practice	Quizzes and games for practicing grammatical rules, vocabulary, math calculations etc.	CS1, CS2, CS3, CS4, CS5
Google Drive	Online classroom depository: The teacher and the students used it as a common space to upload and share their work (used a class Google account).	CS1, CS2, CS3, CS4, CS5
Google Docs	Online text processing: Students created a text file using the classroom's Google account (enhanced continuity and collaboration).	CS1, CS2, CS3, CS4, CS5
Google Slides	Online slide creator: used for sharing group work and presentations.	CS1, CS3, CS4, CS5
Google Forms	Online surveys/quiz creator: used during IBL activities and/or as entrance ticket or for assessment.	CS1, CS3, CS5
Blogger	Blog creator: Students posted comments on the classroom's blog or created their own blog for group activities etc.	CS5
Office 365	Word, PowerPoint, Excel, OneNote: Partially used (not installed on all devices). Supplemented by Google Drive/Docs/Slides etc.	CS1, CS2, CS3, CS4
Mahara	E-portfolio development (through a process of a 'learning journal').	CS5

Table 4.8. *Digital tools most widely used during IB-FC implementation*

CHAPTER 5: Presentation of Results

In this chapter, research results will be presented which relate to the first two research questions:

(a) RQ1: What are the experiences of teachers, students and parents in different IB-FCs in Cyprus primary school context?

(b) RQ2: What are the overall perceptions of teachers, students and parents on different IB-FCs in Cyprus primary school context (benefits, challenges, limitations of implementing an IB-FC model in different subject matters)?

In the first section, experiences of teachers, students and parents will be discussed, focusing on what actually occurred at each stage of IB-FC implementation: i) Pre-class, (ii) In-class and, (iii) After-class. In the second section, overall perceptions of teachers, students and parents will be presented, bringing together the benefits, challenges and limitations of the IB-FC as a whole. Teachers' pseudonyms and the CS coding (as illustrated in Table 3.2) will be used interchangeably, and the coding of students as explained in Chapter 3 will be used (e.g. S1.# for CS1). P1-P41 coding will be used for parents, whereas quotes from the observation protocols will be cited in text boxes, using the CS code and the exact date of the recorded classroom observation.

5.1 Teacher, Student, Parent Experience

5.1.1 Pre-class experiences.

Here I will present four themes drawn from my analysis of interviews, questionnaires, classroom observations, reflection diaries and lesson plans and which all relate to the pre-class experiences: (a) formats of flips; (b) formats of activities; (c) required time for flips and activities; and, (d) supports.

(a) Formats of flips

Flip/flips in this section will refer to prepared or ready-made material in any format (e.g. video, presentation, online sources etc.) given to the students for study at home so as to be able to complete an activity on its content (entrance ticket) and follow in-class instruction the next day at school.

The format and rationale of a given flip was the first thing to discuss with the teachers who recognized that it is of great significance to have a flip which would substitute '*What I would otherwise lecture the students about anyway*' (*Mary*). If the teachers judged that it would be better to let the students do some research about the new information and turn up with their own answers, then a flip was not given. In any case, teachers claimed that '*The flips should have a 'value-added' to the learning process'* (*Ben*) and therefore '*The model should be used selectively and not for every lesson we have during a school day'* (*Rosemary*). All teachers also emphasized that they always tried to make sure the content of the flip was appropriate for '…*the students to move on to investigation activities in class'* (*Tesa*).

Video

The terms '*video*' or '*video-tutorials'* are used here interchangeably to refer to any flips given to the students in the form of a video. All student participants were excited with the video-tutorials as they all recalled that the best time they had was when they watched the videos at home, especially the ones with completely unknown content, e.g. *'I liked the videos and when we were writing about it, but most of it I liked the long videos that were showing things I didn't know before' (S1.5),* ranging from topics such as birth of turtles, garbage collection, war in Italy etc. Many students showed a preference for the Maths' videos (n=38), especially the ones with many examples. For example:

'*One of the students commented in the forum that the video-tutorial was really nice and that it included many examples.*' (CS5-13122017)

All teachers in this research have mostly used ready-made video-tutorials instead of preparing their own, evidenced in Figure 5.1. Youtube, TeacherTube and the Khan academy were mentioned by the teachers as the most popular websites for ready-made video-tutorials. However, most of the existing online video-tutorials for primary education are in English so some teachers would choose to translate those instead of creating new ones, e.g. '*Tutorials in Greek are not that many but you could spot some good ones, mainly on TeacherTube, if you had done a better research'* (*Mary*).

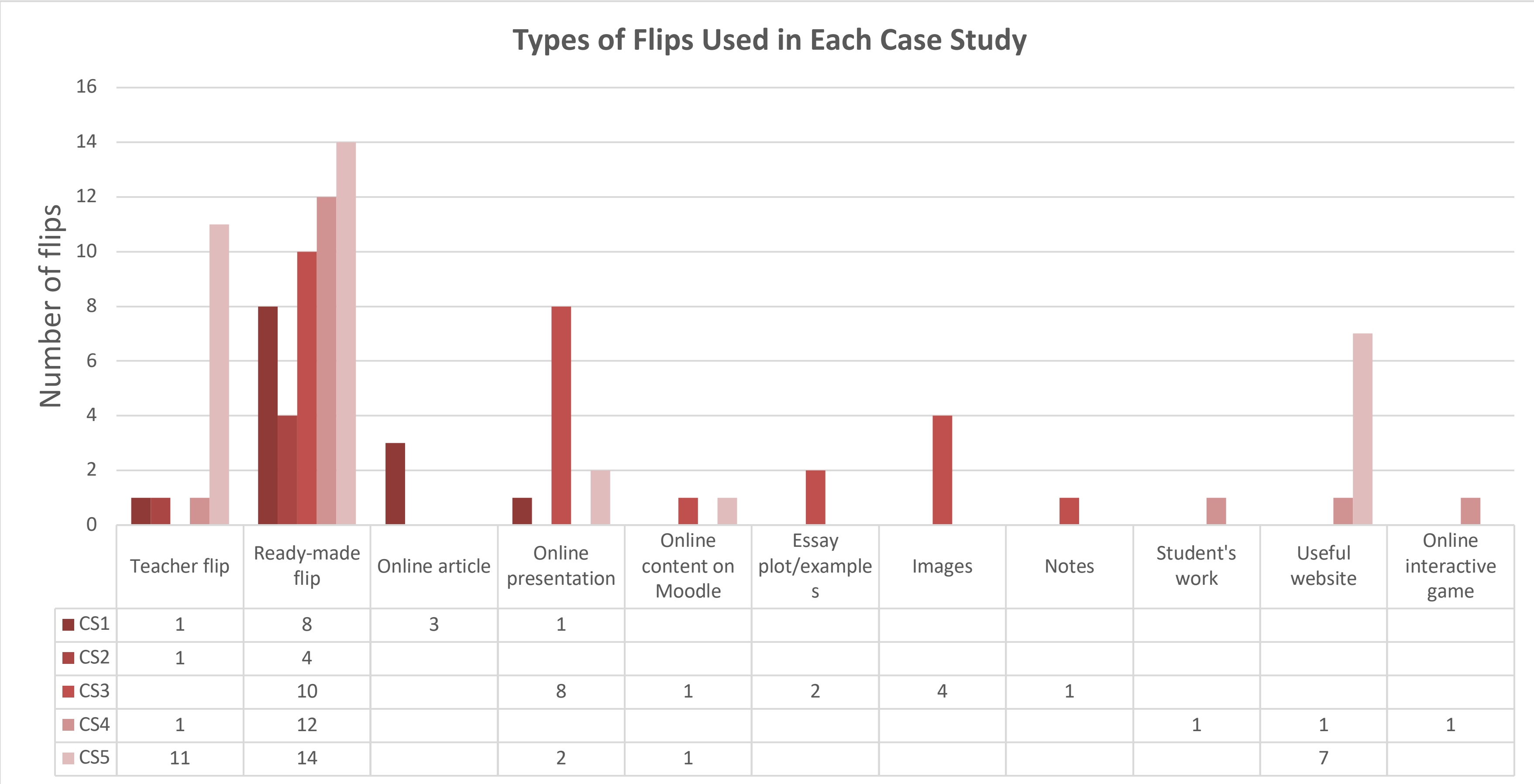


Figure 5.1. *Types of flips used in each case study*

Teachers preferred to use ready-made videos, embedded on Moodle (see Figure 5.2) for various reasons. One of the teachers, *Ben*, specifically said that it is easy for him to find ready-made videos because he has been teaching the same syllabus for years and knows exactly where to search. Therefore, his only concern was to design the activity (the entrance ticket) which would accompany the video or maybe simplify the text used as an explanation to the video.

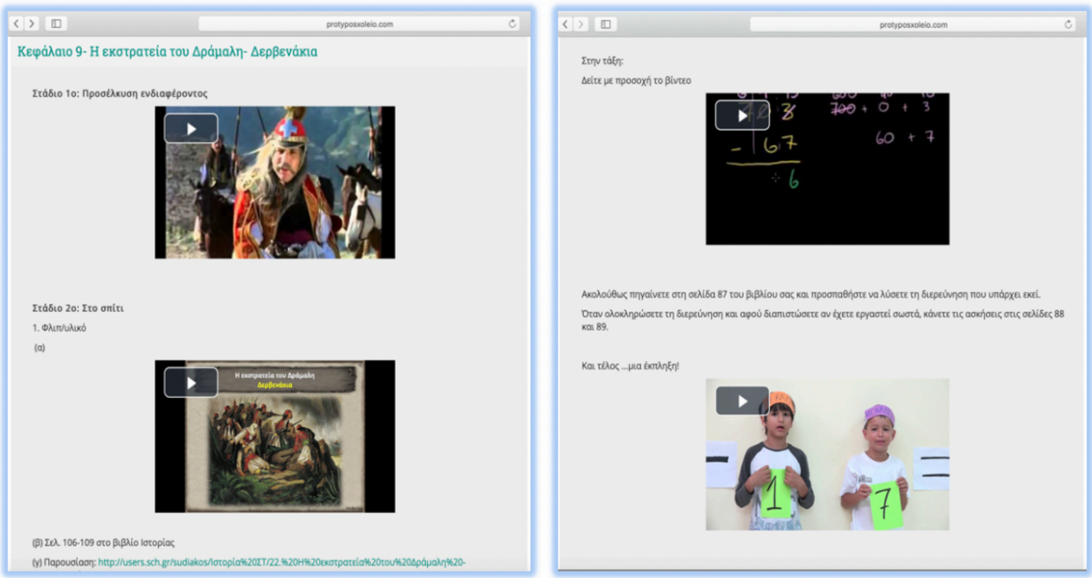


Figure 5.2. *Moodle embedded ready-made videos -Screenshots*

Another teacher, *James*, said that it is a matter of saving time since they teach so many different lessons and they cannot specialize on one. Therefore, it is much easier to use a ready-made video than to create one. For example:

> 'It was so hard *with so many kids at home making noise until too late. So first you had a look if there was read-made content and then you had a look at how you could create your own, if you had to*' (*Rosemary*).

It was also reported how easy it is to do a voice-over (see Figure 5.3), e.g.:

> '*…just download a ready-made presentation on the lesson or theme to be taught and do a voice-over if it is in a different language or do a narration if it has no sound, creating the flip in Camtasia.'* (*Mary*)

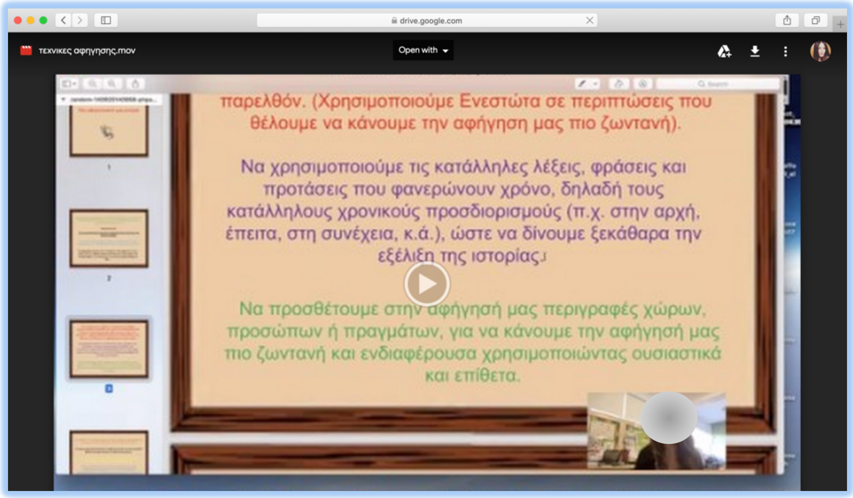


Figure 5.3. *Voice-over of ready-made video (CS5)- Screenshot*

In any of the two cases, it gets more personalised when the students listen or even watch their own teacher in the video, even with only a camera window on the side.

Mary chose many times to prepare her own video-flips whereas *Tesa, Rosemary* and *Ben* had time to prepare only one video. *James* had the least experience in technology integration programs and even though he was willing to try to create his own videos, he has only used ready-made ones and has used flips in many other formats (see Figure 5.1). *Rosemary* also hesitated and struggled at first to develop her own video and follow model implementation structure, e.g.:

> '*In the beginning, I had some difficulty with the model until I got used to the way the flips are developed but with the help of the researcher and the tools she gave me and the examples, it was ok. It was indeed some kind of professional development opportunity having to learn first what the model* [IB-FC] *is about and then how this can work with young students in a way that does not disorient them but instead engages them in the learning process much more.*' (*Rosemary*)

In either case, teachers believed that the best flips were the videos (either teacher-made or ready-made) which periodically paused on their own and posed direct questions to be answered in real time by the students. This was done for example through Vizia (https://vizia.co), an interactive video-creation online software. The teachers sometimes uploaded the video-tutorials on their classroom's Google drive (see Figure 5.4) and shared the link on Moodle or uploaded the video on Moodle directly (see Figure 5.5). Whatever their choice of video-preparation process, teachers always made sure that they acted according to copyright laws and therefore the name of the person who had created the initial flip was also mentioned within the new one.

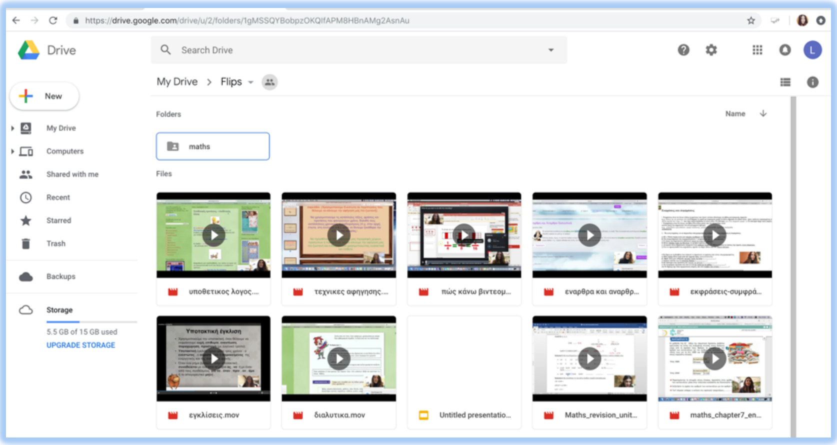


Figure 5.4. *Google-Drive screenshots with uploaded teacher flips*

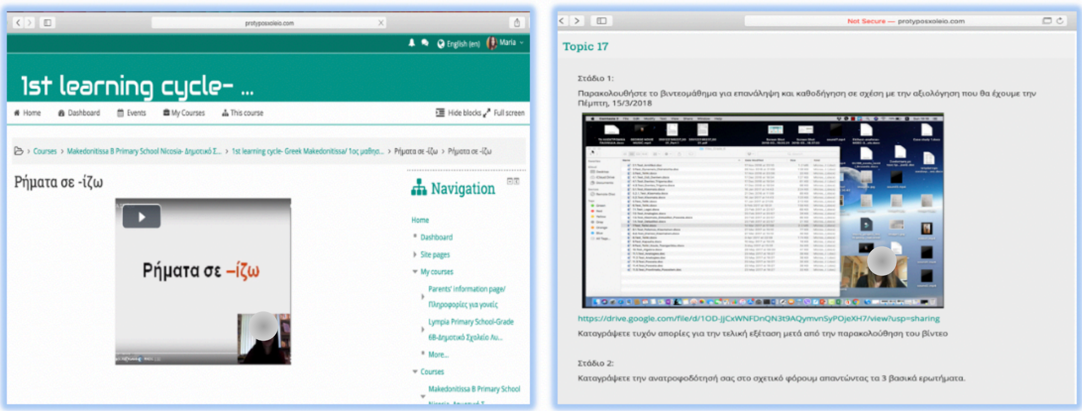


Figure 5.5. *Moodle embedded teacherfFlips (CS2, CS5)- Screenshots*

In regards to the students, they would expect the funny part in each of the videos to pop up, as *Mary* enthusiastically exclaimed: '*And they would expect my daughter to pop-up in the camera window with me every time. They enjoyed it. Or I would try and give them a joke sometime in between'*. The number of times they would watch it '*depended on the video'* (S5.2) and '*the assignment'* (S5.4). As some students said, '*It depends…we are all different' (S4.1)'; 'I kept playing it [the video] all the time, and if I wouldn't understand something I would* *press 'pause', rewind and watch it again…' (S1.7).* Most of the students claimed watching the video twice so as to be able to complete the entrance ticket, while some felt a bit disappointed if they had to review the video far too many times in order to understand and remember its content*, e.g. 'Because basically you have to watch it, watch it again, to read it, to know what happened at every stage and so, for that. Perhaps others may say it's easy, but for me it was a bit difficult' (S3.5). Hence, n*ote-taking whilst watching the videos was one of the most common strategies some students (n=14 out of 77) had suggested, e.g. *'To write a few things about the content of the video, what we've understood' (S1.1).* The language of the video was also important for the students to clearly understand its content, for example: *'The video was difficult for me because they speak English' (S1.8)*.

Parents' responses regarding their own experiences at home whilst their children have been watching the videos have been very positive, for example:

> '*We know as parents the homework our children have and the video-tutorials help us know the way that you work in class. This means that we can explain to our children an activity that they didn't understand. It helps the students to become good users of computers. It makes the lesson more interesting*.' (P5.1)

Generally, all parents found it '*very interesting'*, with only a few (n=9 out of 41) pointing out the fact that their children are sometimes busy enough with other homework that they felt tired and pressured to watch the flips.

Others

All teachers agreed that there were times that they have chosen to give out flips in other formats than videos. They would either upload a single flip in a different format each time or sometimes upload multiple flips in various formats, giving students a choice, as shown in Figure 5.1 (e.g. online articles, presentations, example assignments etc.). What one teacher said is also important:

> '*They would normally need to watch the video on a compulsory basis and have the rest of the resourcing* [flips] *as optional. Otherwise, they would be given more time to work on all of the resources* [flips] *given to them and complete the equivalent entrance ticket*.' (*Mary*)

In exceptional cases, teachers (e.g. *James, Mary*) gave out images or useful online content (websites) as flips. Teachers highlighted that the content of the flips in other formats (beside video) shouldn't give students a hard time to understand and work with, e.g. '*Sometimes I tried to use links with online articles but it was difficult for them due to their lack of experience and also their parents couldn't help them*.' (*Tesa*)

Teachers mentioned that in many occasions they would offer flips in various formats (video, audio, text) on the same day, evident in lesson plan analysis (see Appendix 3) in an effort to cater different learning styles, or assist students who had a different mother language. *James*, in particular, had too many foreign students in his class (70%) and believed that videos assisted in overcoming many language problems. Nevertheless, almost all students (n=66 out of 77) pointed out that they preferred the video-tutorials as the main source of information uploaded on Moodle, with only a few (n=13 out of 77) pointing out a preference for a combination with online resources and presentations as well.

(b) Formats of activities/ Entrance ticket

The term '*entrance ticket'* refers to the activities the students had to complete after watching/studying the flip/flips given at home. These activities are assigned together with the flips in order to make sure the students actually watch/study them and are well-prepared (if the entrance ticket is correctly completed) for the next day's lesson in class. Most of the participant teachers (*Tesa, Rosemary, James, Ben*) mentioned that they also tried to break the work at home '*into pieces'* so that the assignment was only referred to the particular flip or theme within a flip.

Teachers also admitted that the flips give them a chance to assign activities as homework/entrance ticket which they would otherwise not give out, for example:

> '…*because for being able to do it they must have had access to what I'm telling them in class which is what the flip does now for me…they can find the lesson on the platform and so they can do it.'* (*Ben*)

James also believed that a flip does not necessarily need to go along with an entrance ticket:

> *'My students don't like to write, they like watching…It was in Geography.*

> *They had to watch a presentation with many videos about animals from Africa, North Pole etc. They liked it a lot. And when they came back to class, so we could gain a deeper understanding, I was surprised with the fact that they already knew the content of what I've uploaded.'* (*James*)

Concerning students, most of them in *Tesa's* and *Ben's* classroom mentioned that it was a bit demanding for them to complete the entrance ticket. They complained they have too many things to get done, e.g. *'We were writing answers and a lot of things' (S1.5)*, especially when they should answer questions (S4.20, S4.23), or create something on their own, without the presence of the teacher. For example: *'It was difficult when we had to write a poem after' (S4.21*). In contrast, most students in *Rosemary's, James' and Mary's* classroom talked of how easy and fun it was to complete the pre-class activities, i.e. entrance tickets, with no real help needed from their parents (S3.9) and felt excited '*working on tablets at home after five years at primary school'* (S4.21). *'It was kind of fun…To do assignments for what we've watched so we could check if we know it' (S5.4).* The latter quote, like many similar ones (n=19), indicates that they also liked going through self-assessment procedures before entering the classroom the next day to see if they would get things right.

Moodle embedded

Teachers claimed that their choice in preparing particular entrance tickets always had to do with lesson goals and Moodle activities/tools (see Figure 5.6).

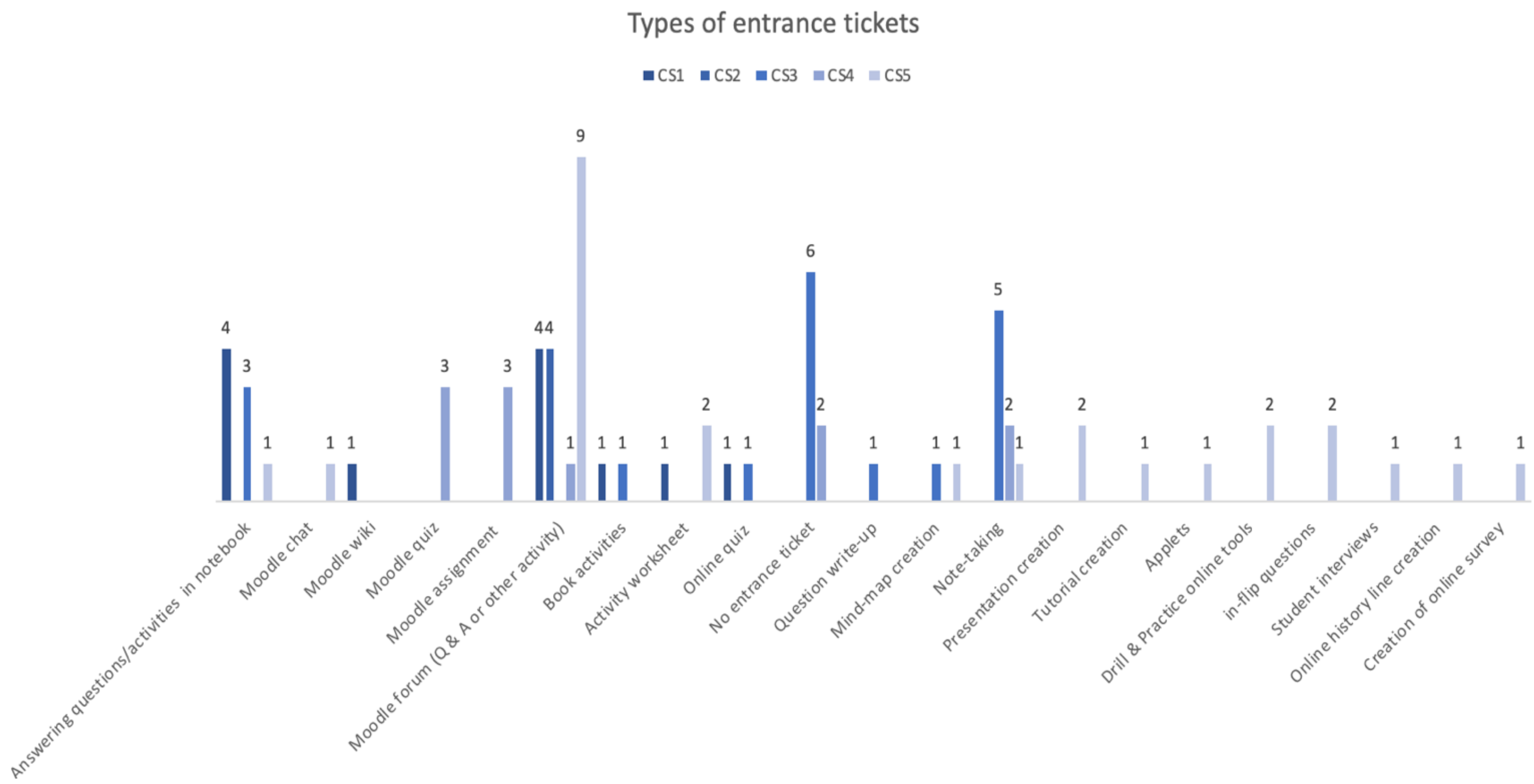


Figure 5.6. *Types of entrance tickets used in all case studies*

As Figure 5.6 illustrates, Moodle activities were mostly used as they offered a good selection (chats, wikis, quizzes, forums etc.) whereas '*any others unquestionably demanded more time to prepare*' (*James*). The most widely used Moodle activity was Moodle forums, either for answering questions (see Figure 5.7), initiating discussions or students creating their own threads for better and simpler peer assessment processes (see Figure 5.8).

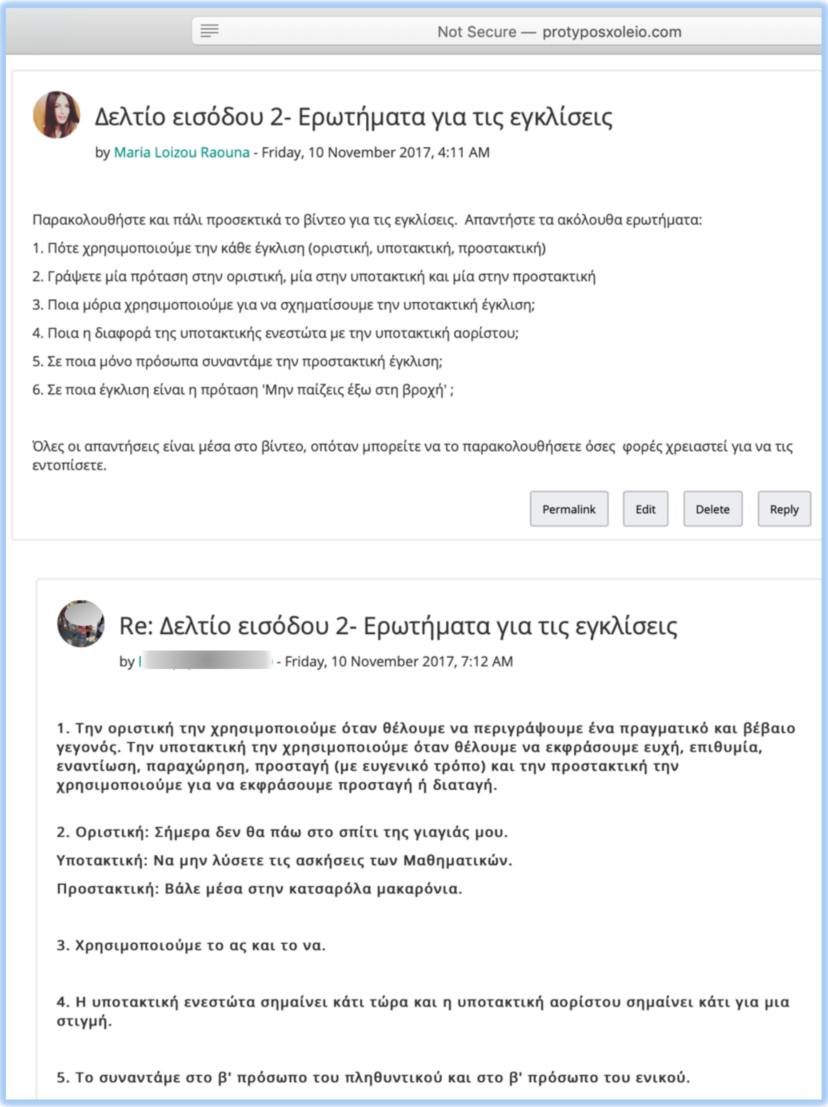


Figure 5.7. *Moodle forums used for answering questions (Entrance ticket)*

Figure 5.8. *Moodle forum used for peer assessment (Separate threads)- Screenshot*

Even though parents believed that '…*teachers had been using the platform very well*' (P3.2), there were additional suggestions about extending the timing of the platform in finalizing students' responses in forums, allowing for correction of errors, especially after they (the parents) had a chance to sit with their children and offer extra help/advice/ideas. For example: '*The answer should be finalized on the platform when the student decides and not done automatically by the system'* (P2.1). Another idea was *'…allowing parents to keep track of the students' progress'* (P5.2) through the same platform, something that was not pursued during the research.

Others

Teachers emphasized the importance of assigning alternative kinds of activities using other online tools (besides the ones embedded on Moodle), as illustrated in Figure 5.6 as well. For example:

> '*Sometimes they* [the entrance tickets] *had to do with completing mind maps … finding keywords and writing a short review, taking a quiz, getting prepared for a personal interview etc. Or sometimes they had a worksheet to complete, either online or a hard copy, the latter rarely done. The most innovative one was the flip* [video format] *which would periodically stop and pose questions to the students to answer before moving on. That made sure that all students thought about content…*' (*Mary*)

The reason the teachers avoided hard copies was due to '*the difficulty to assess offline work*' (*James*) and also given that '*students preferred working on their devices*' (*Tesa*).

Overall, the entrance activities which the students recalled during the interviews as their favourite involved descriptions (S4.15), advertisement creation (S3.5), dealing with Math applications (S3.6), answering questions on Moodle (S3.2), taking notes or commenting on the video (S5.13), creating glossaries (S3.5), playing games (S4.19), developing multimedia such as puzzles (S5.14) and story-telling (S5.11). The most innovative activity was when students were asked to create their own video- tutorials aimed for their fellow classmates. For example: *'The tutorials we have created ourselves. We worked in pairs and*

Miss M. showed us how Camtasia works. So we did it!' (S5.4). Students also enjoyed the fact that the assignment was directly sent to their teacher (S3.8) and/or made visible to their peers for the option to receive peer feedback, e.g. *'… questions on Google Drive' (S3.2).* It also sounded a good idea to create the tasks themselves, such as quizzes for the other classmates, or even play educational games rather than writing up answers to questions, e.g. *'Let's say to play a Math game, or a Greek game, crossword, online board games…' (S5.17)*.

Parents would sometimes guide their children in gathering some information but overall they noted that, '*She hasn't faced any difficulty with anything because she understood everything her teacher has explained to her*' (P3.3). Parents suggested that students should '…*not have any other homework on the day they had to watch the video and complete the activity*' (P1.1) to avoid students' complains about workload at home.

(c) Required time for flips and activities

The length of the video or flips in other formats was also critical. Teachers acknowledged the value of short videos/flips, e.g.:

> *'I was trying to find short ones* [videos], *5-10 minutes, but even the longer ones when I couldn't edit them and make them shorter, I suggested to the students to watch let's say from the 5th till the 12th minute. Do you want an example? The documentary 'Supersize me' is about 1.5 hour, I spotted specific sections for them, so they were watching let's say from the 5th to the 8th minute and then some other*

minutes.' (*Tesa*)

The length of the video played an important role for students, especially if it was as long as an hour (S1.7), e.g. *'It was difficult, the video was going on and we had to write. I was getting angry' (S1.5).* Students also made clear that it is better to have no more than a single video to watch every afternoon to avoid stress and mainly confusion, for example: *'To find answers in an easy way, not watching too many videos on the same day because we might forget everything about them, we might get confused' (S2.21).*

Moreover, most of the times teachers preferred to use short activities as entrance tickets, ranging from multiple-choice questions created with the equivalent Moodle tool to using a Moodle forum for posting short answers, '…*taking no more than 20 minutes*' (*Tesa*).

> '*It was a very small activity, something that wouldn't take more than 5 minutes to complete, just to check that they have worked with the material. In such cases you also have students that are going to answer whatever just to get it done.'* (*Ben*)

This quote verified the disengagement of some students to do the work, discussed in a later section, and how some teachers tried to keep work to a minimum to make sure it was completed by the majority of students. Students (n=15) obviously noted that it was better to have a short entrance ticket to complete rather than a long one.

Students also never liked complicated assignments, *e.g. 'To remember, to go to a specific webpage, find the specific lesson, the specific section, the specific* *question and answer it' (S4.5).* The lack of time to assist their children in the best way possible was another issue raised by a few parents (n=7 out of 41). For example:

> *'…We do not have all the time this requires.'* (P2.15)
>
> '*It took time to learn the programs. It took a lot of hours sitting next to my child to teach him how to use the program, the computer and how to type. Sometimes the computer would get stuck and therefore it took a long time to complete their homework.'* (P5.1)

In addition, many students (n=29 out of 77) were concerned about the time given for watching the flip and completing the entrance ticket. One afternoon was the standard time given to students to complete the entrance ticket, with exceptions in *Mary's* classroom where students worked with multiple resources for a few days. In the interviews, students asked for more than one day, usually two days, to allow for teacher review and feedback. For example: '*To upload the flip and the work 2 days before the day he wants us to complete them, he can check if they're right, give us feedback and so we can get it right for sure before class*' (S3.5).

(d) Support

Parents

Teachers would guide the parents how to help their children at home. This was done mostly during the introduction of the model and the first parents-teacher meeting at school. It was also done periodically in person later during the year, responding to particular parents' requests. In one exception, *Tesa* tried to guide the parents in a more practical way, but it hasn't been successful. She prepared Moodle screenshots with step-by-step instructions, including arrows and comment balloons and gave them out as hand-outs. However,

> '*The reaction I got was that the parents came and said you know we think that we don't like this thing, it's not pleasant for us or for the kids... They counted the pages I would give them and they said: Oh my God we have 10 pages of work and that.' (Tesa*)

What actually happened at home was that some of the students, as they reported, asked their parents (both or one of them) for help (n=12 out of 77), e.g. *'My mum knows what I am doing, my dad doesn't know' (S2.14).* The fact that some parents cannot help their children due to their incompetency in the use of ICT was also evident in the students' interviews, e.g. *'Our parents don't know, they don't have this knowledge, like we do regarding computer' (S5.14)*. In such cases students either dealt with the assignment themselves (S4.25) or *'… we were asking our parents to write a note and they were justifying that we couldn't do something' (S3.8).*

Most of parents' responses and experiences (n=35 out of 41) have been positive indeed (see Table 5.1). A few parents though (n=13 out of 41) have also spoken of how '*Any kind of innovation has its challenges. What is important is to use these challenges for learning something new and make it feel like a game'* (P1.2).

Parents' responses: Teacher support	*'We didn't have any particular problems or difficulties as parents.'* (P5.7)
	'They could communicate with their teacher if they faced any difficulties.' (P3.8)
	'I didn't do anything myself. I like it because she had all the information she needed.' (P2.23)

Table 5.1. *Examples of parents' responses regarding their own support during implementation*

Overall, challenges involved '*to be able to come through the demands of this methodology'* (P1.1), 'to get *the student used to this kind of working and carry his computer to school'* (P4.11) and getting to know how to use the platform, e.g. '*We cannot help our children if they have any questions because we do not know how to use the platform'* (P5.5). Some parents also spoke of how they were *'…scared of the computer, a stranger to me, because with my older children we studied the traditional way'* (P2.10).

Despite the challenges, parents (n=39 out of 41) generally spoke of how they liked the fact that they have participated in the research, especially at the later stages of the model's implementation, e.g. '*I liked it yes and I also get to learn myself new methodologies in teaching* (P2.2)'; '*We also learned ourselves as parents through our kids and their work*' (P5.3). They also recognized that their own positive stance as parents on the model affected their children's willingness to work more effectively and spend time with them as well, e.g.:

> '*I believe I was like an assistant to my child or even consultant in how to use the computer. The positive thing is that I had the knowledge to do*

so. I liked it because I spent time with my child and learned things through that myself.' (P5.1)

In some occasion, parents said that it helped themselves as well in learning how to help their children (through the flips).

Parents have also considered their role as vital in dealing with possible connectivity issues or in offering advice about internet safety. For example:

> '*Occasionally I would offer help with the use of the internet. We had discussions about the right use of the internet and the use of the technological equipment. I liked this chance which was given to me a lot.'* (P4.2)

Overall, parents (who had the skills and the time) enjoyed the experience to guide their children, either in how to improve their final work giving out their ideas as parents or through their help in how to embed pictures or other multimedia. They valued their role as more important during the introduction of the program because as the school year proceeded almost all students (of any age) learned to log into the platform with no particular problems and work independently.

Most parents felt more relieved as time passed as some of them (n=14 out of 41) never had the required skills or felt stressed about their ability to help their children, as mentioned earlier. In fact, some of the parents (n=12 out of 41) claimed that they should be given more practical guidance and information on the potential, prospects and actual implementation of the model before its introduction. One of the parents proposed to be given '*an email notification on* *the addition of new text or video for example or some sort of alert notification for the answers uploaded to the different questions'* (P2.1) so they could play as parents a more vital role during the pre-class session. Three other parents proposed the development of a separate platform for themselves (as parents) so as to get informed of their children's work.

There were certainly many parents (especially in CS3, CS4 and CS5) who believed that they could not make any other contribution as parents, especially '*In the age that our child is…* (P5.8)' (Grade 6) (n=9 out of 41), mostly because their child never needed their help, e.g. '*All the information they needed was on the platform, she could do it all on her own*' (S3.5). A few parents (n=5 out of 41) even denied playing any other role since '*the work should be explained in class and the students should be able to work on their own, without their parents.'* (P5.11)

Teachers

In cases when there was no direct, real time communication with the teacher during pre-class session (*Tesa's* & *Rosemary's* classrooms), it has been strongly requested by the students that there should be a way to talk to their teacher, e.g. '*For me...I want a way to conduct our teacher so she can explain to us more*' (S1.4). This didn't mean that they got no teacher support. Almost all students (n=71 out of 77) said that they got some kind of support they might have needed from their teacher, whilst completing their entrance ticket. Table 5.2 summarizes a few of students' quotes on teacher support.

Interview question SA.6	
	'If I didn't know something she gave us an exercise book that had lots of things inside to work with.' (S1.7)
	'If I had a problem with something I did not understand I was sending a Viber message to Mr. K.' (S3.8)
	'We could send him a message on Moodle or ask help from our parents.' (S4.20)
	'But we were able to understand most of the assignments.' (S1.5)
	'She would explain to us how to do it in the chat.' (S5.11)
	'We asked our teacher to explain to us the next day and we did it at school.' (S3.6)
	'Phone-call (laughs).' (S5.4)
	'Yes, we could text a classmate or our teacher.'(S4.3)
	'No! She was offline all the time.' (S2.21)
	'She would explain to us while we were in classroom and we remembered.' (S2.14)

Table 5.2. *Examples of student responses to interview question SA6: How did you get any help/assistance when needed?*

James', Ben's and Mary's students even had the opportunity to personally contact them during afternoon hours, either through Moodle, Viber, SMS or a phone-call, e.g. '*Teacher's support was far beyond satisfactory with personal contact available, either online by phone or even in person'* (P5.2). In *Ben's* classroom, the students learned how to use Moodle for texting their teacher or even their peers for help. In a few cases, a Moodle chat was used for answering questions, e.g. *'She would explain to us how to do it in the chat' (S5.11).* In *Rosemary's* classroom, the teacher also made sure the students knew exactly what to do by posting the necessary information online or explaining the day after. All parents also talked of how the teacher had an excellent relationship with their children and themselves, offering his support anytime.

Teachers would check on the entrance tickets before the in-class session and provide feedback, either during the same afternoon, giving time for correction of errors, or the night before coming to class where errors would be corrected by students the day after. Specifically, during the pre- and after- class phase, teachers usually used the Moodle forums to give feedback on the entrance or exit tickets. They also periodically asked students to upload their work using the 'Upload Assignment' tool through Moodle to give more personalized feedback and sometimes an effort grade was also given (see Figure 5.9). '*Grades used were usually 0 for no effort, 1 for minor effort with mistakes to be corrected and 2 for good effort with minor mistakes*' (*Ben*). Another strategy was to discuss the correct answers for the first time in class and '…*then the students were doing self-evaluation/assessment at that time'* (*Tesa*).

Some of *Tesa's* students worked on the entrance tickets during the afternoon-school hours (not available in other participant schools) and therefore '…*the teachers there help our children*' (P1.3) and did not transfer any work at home.

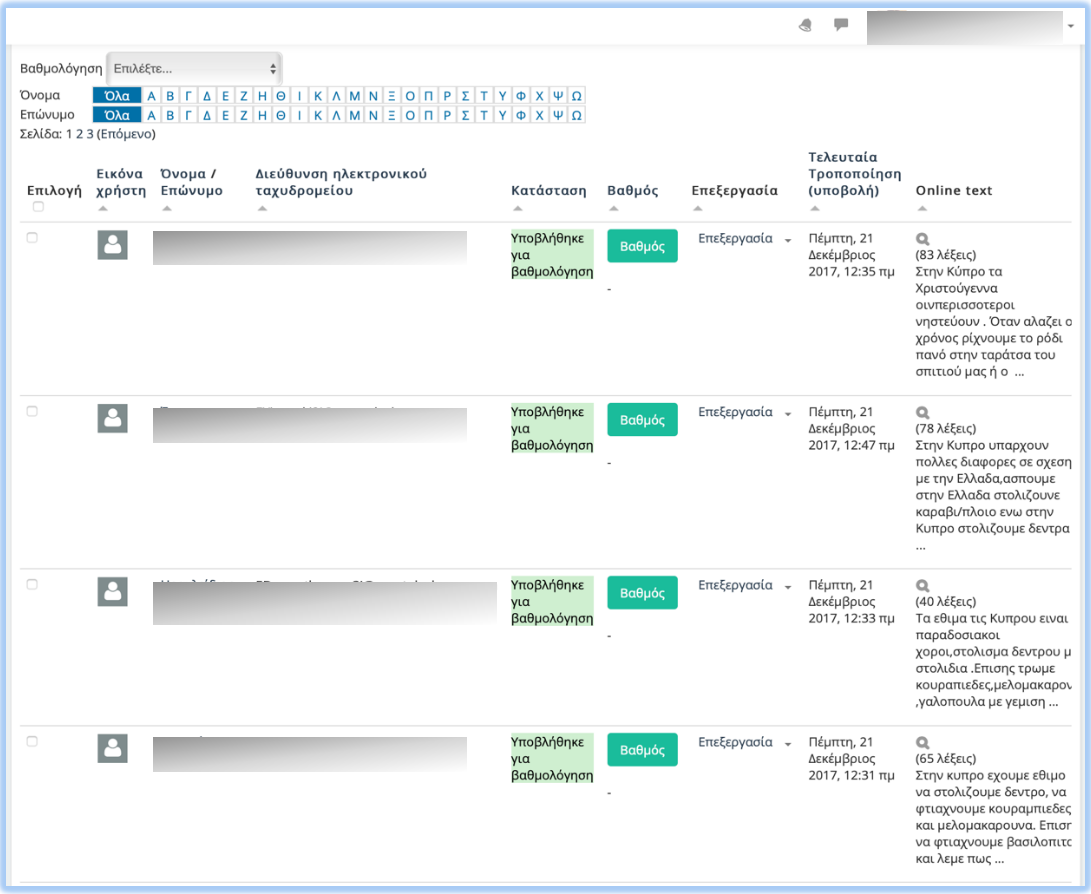
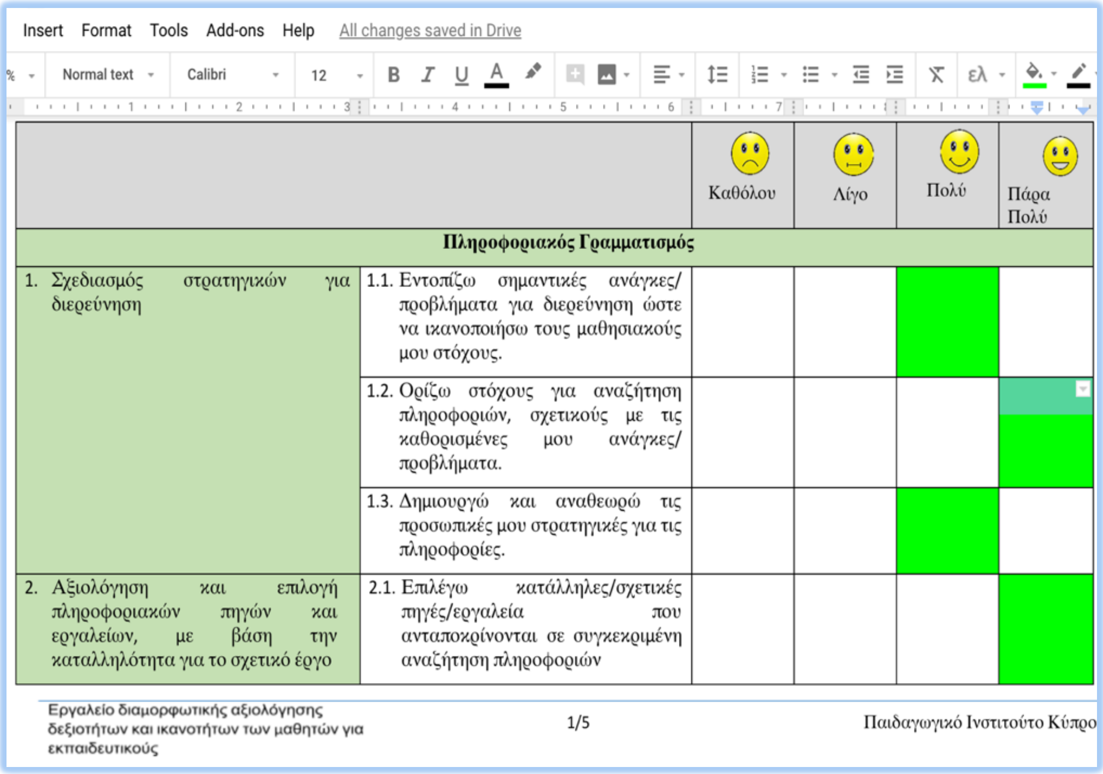


Figure 5.9. *Moodle assignment upload for grading and comments (CS3)- Moodle Screenshot*

Others

Given that some parents could not provide any assistance to their children at home, a few students have mentioned turning for help from other older members of the family, e.g. *'I was asking my sister' (S4.20)*. Teachers also promoted peer feedback and assessment through the use of pre-set criteria or uploaded rubrics (see Figure 5.10).



		Καθόλου	Λίγο	Πολύ	Πάρα Πολύ
Πληροφοριακός Γραμματισμός					
1. Σχεδιασμός στρατηγικών για διερεύνηση	1.1. Εντοπίζω σημαντικές ανάγκες/ προβλήματα για διερεύνηση ώστε να ικανοποιήσω τους μαθησιακούς μου στόχους.				
	1.2. Ορίζω στόχους για αναζήτηση πληροφοριών, σχετικούς με τις καθορισμένες μου ανάγκες/ προβλήματα.				
	1.3. Δημιουργώ και αναθεωρώ τις προσωπικές μου στρατηγικές για τις πληροφορίες.				
2. Αξιολόγηση και επιλογή πληροφοριακών πηγών και εργαλείων, με βάση την καταλληλότητα για το σχετικό έργο	2.1. Επιλέγω κατάλληλες/σχετικές πηγές/εργαλεία που ανταποκρίνονται σε συγκεκριμένη αναζήτηση πληροφοριών				

Εργαλείο διαμορφωτικής αξιολόγησης δεξιοτήτων και ικανοτήτων των μαθητών για εκπαιδευτικούς 1/5 Παιδαγωγικό Ινστιτούτο Κύπρο

Figure 5.10. *Example of assessment rubric (CS4)- Google Drive screenshot*

This has given students a chance to cross check their own work as well. The students even offered technical support to each other '*either by calling one of my friends or I sent to C… a message on Moodle and he would give me the code'* (S3.2). Students in Mary's classroom (being more ICT literate) also found additional resources themselves to solve any inquiries, e.g. '*I was not sure about it* [the location of a country mentioned in the Geography tutorial] *so I have used Google Earth and a YouTube video which was very helpful…like a documentary.'* (S5.16)

5.1.2 In-class experiences- IBL activities.

In this section I will present two themes drawn from my analysis of in-class experiences of teachers and students. These include (a) Less engaged and management and (b) IBL activities.

(a) Less engaged and management

Misconceptions and less engaged students

The teacher asks the students why they hadn't watched the video *-I forgot to watch it.* *-It wouldn't log in (Moodle).* *-I couldn't find my password.* (CS1-01022018)

When students didn't watch the videos at home (or interfere with the flip in whatever form given) and did not complete the entrance ticket, this was deemed as a '*crisis'* situation in a FC model, since the teacher could not proceed to the in-class activities. The same happened when students did not understand the flip or had somehow developed misconceptions through it. Nevertheless, students mentioned that they felt comfortable enough to ask their teacher for further clarification (n=42 out of 77). The teacher would emphasize of course that they need to actually watch it more than once to make sure that they comprehend the content. For example:

> *'The teacher always says that we have to watch it again in order to understand it and then complete the entrance ticket. If we wouldn't do it she would say 'why you didn't watch it for a second, third time?' (S5.3)*

‘*In the beginning, the students were complaining that the activities were hard, that they don’t understand but the teacher said that they had enough time to complete the activities (from Monday till Thursday). On Tuesday, most of the students told the teacher that the activities, the flip and the entrance ticket were very easy to watch, understand and complete.’ (*CS1-29032018)

In any case, teachers always posed introductory questions in the class in order to get a clear view of what was understood. Then, as *Mary* mentioned, ‘*If I realized that something was not as clear as it should be, I would explain once more in class and also provide personalized feedback to those students.’* (*Mary*)

What would happen when the flip was not viewed or the entrance ticket not completed? Indeed, students’ lack of responsibility and ‘*feeling lazy’* (*Ben*) was the main implementation problem teachers had to deal with. Teachers talked of how impossible it was to move on to the IBL activities in class whenever they would realise that only a few students have watched the flips and completed the entrance tickets (or completed it in a haste), occurring mostly in *Rosemary’s* and *Ben’s* classrooms. For example:

> ‘*Forum discussions were to a minimum and they couldn’t provide any excuses for not doing the work because I know they had internet connection. I could see they were playing online.’* (*Ben*)

> ‘*I think it was due to low levels of students’ responsibility and responsiveness. I think the students wouldn’t usually bother to log into the platform and have a look at the content.*’ (*Rosemary*)

A few students (n=12) talked about a possible *penalty*, especially *'…if it happened on a regular basis. But this never happened till now' (S3.2).* What actually happened was that there were one or two students in each case study who regularly came to the class unprepared. *Mary* talked of how the rest of the students were furious on these irresponsible and disengaged students because they were wasting their classroom time and kept everyone on the pause for the in-class activities since the teacher sometimes had to play again the video-flip in class. For example:

> *'Specifically, we have a classmate who was forgetting to watch the video lesson … then some assignments that he didn't know how to do and we had to explain to him again. And wasting time.' (S5.13)*

'*The student (S5.2) sitting next to the student who hadn't watched the flip at home (S5.3) asks him 'But why haven't you watched the flip at home and do your work?'. S5.3 does everything wrong and S5.2 is trying to make him understand his mistake* (CS5-14032018).

Dealing with the less engaged students

How would teachers deal with the less-engaged? The teachers would sometimes play the video again in class for everyone to watch it; at other times they would ask the students to watch it on their own in class (using their headphones) and either complete the entrance ticket in class and join the rest of the students afterwards in the other IBL activities; or watch the video on their own and complete the entrance ticket the same afternoon. Indeed, a few students (n=12) reported that their teacher gave them a way out by asking them to bring-in headphones (E.g. ‘Basically, he *told us we could bring our headphones and if we didn’t watch it at home, we could watch it in class’ - S4.21)*, cooperate with other students or complete a handout as an entrance ticket (E.g. *‘Our teacher would give him/her a handout to write some answers for some questions and then s/he would work on the tablet’ -S4.6).*

In any case, those students, as mentioned earlier, ended up with more questions about the lesson,

> ‘…*Of course, I told them off as well…and not only me. The other students in class were also asking why they haven’t watched them…. So, everyone else also felt mad at them.*’ (*Mary*)

Maintaining motivation

What also discouraged a few teachers (*Tesa*, *Rosemary*) was that some students who were more excited in the beginning gradually lost interest, e.g.:

> ‘*… but in the process I observed that their excitement decreased. They are tired, bored, they forget, they come unprepared so every time I had to do my lesson I had to come in the morning and check if they did their assignments at home, otherwise I had to tell them to do them in class before we proceeded…’* (*Tesa*)

Rosemary and *Ben* explained that the work at home was not given as compulsory and this affected students' motivation and hence engagement. Offering a choice between activities (entrance tickets) was a practice *Rosemary* and *Ben* have tried for maintaining motivation, e.g.:

> '*In the beginning, it was not compulsory to do the work but recently I have asked them to write something in Greek, a poem about themselves in relation to the video content. So, they either wrote something themselves in their exercise book or did something on the Moodle page using the tools.'* (*Rosemary*)

However, *Ben* mentioned that he would ask his students:

> '… to *either do some activities from the book or do it on the computer but the lazy students wouldn't do it either way or did something in a rush in their exercise book as it is easier than do it on the computer.'* (*Ben*)

Hence the strategy did not always work. On the contrary, *James* and *Mary* felt very pleased with their students' willingness to work and their overall performance. All teachers have also highlighted to students that they should:

'… *watch it (the flip) over and over again, as many times as it takes'* (T-CS5-13122017).

Rosemary also suggested the creation of an in-flip station in class: '*I understand that we do it for saving time but if they do not watch it, at least have a station in class and so the students who hadn't watched it at home, they watch it in class'* (*Rosemary*). All teachers also agreed that if the students use the same device, both at school and at home, they are more likely to work more efficiently during pre-class because they will have all the applications on the same device and the websites and their codes saved in their 'favorites'. As one teacher said:

> '*They will have ownership…when you give to them a school device … it is not the same. It doesn't feel the same. If they bring their own device (BYOD initiative) it would be like their own book or exercise book …so it is easier to sit and work on it at home.'* (*Tesa*)

(b) IBL activities

Kinds of activities

The activities in class were inquiry-based '*engaging and very interesting to the students'* (*Mary*) just like what the IB-FC model encompasses. These activities were the '*extension*' of the flip/flips the students had to watch at home. As one of the teachers explained: '*The flip would provide the initial information, set their mind on what the text was about and then in class we would proceed with the investigation'* (*Ben*). '*Going beyond the book'* (*James*) has been the purpose of every IBL activity as teachers noted and those activities should have been fun, interesting and engaging to the students. '*I searched online if there were any videos that I could use as an introduction to my class, beyond the flip, just to trigger further investigation in class'* (*Tesa*).

Figures 5.11, Figure 5.12 and Figure 5.13 show the kind of IBL activities completed during class time in the Greek Language lesson, Mathematics and in all other Social Studies and Sciences as these have been drawn from the Lesson Plan Analysis. These will be discussed in relation to teacher and student experiences.

Teachers' experiences in creating IBL activities mostly focused on how Moodle tools have been used since '*they* (Moodle forums) *had been very easy to use*' (*James*), especially in the Greek language lesson. Teachers specifically mentioned how forums were useful for asking their students to answer questions, post comments on flips, give feedback to their peers or post the outcomes of individual or group research any time during the learning process.

Figure 5.11. *Types of IBL activities used in the Greek Lesson (CS1-CS5)*

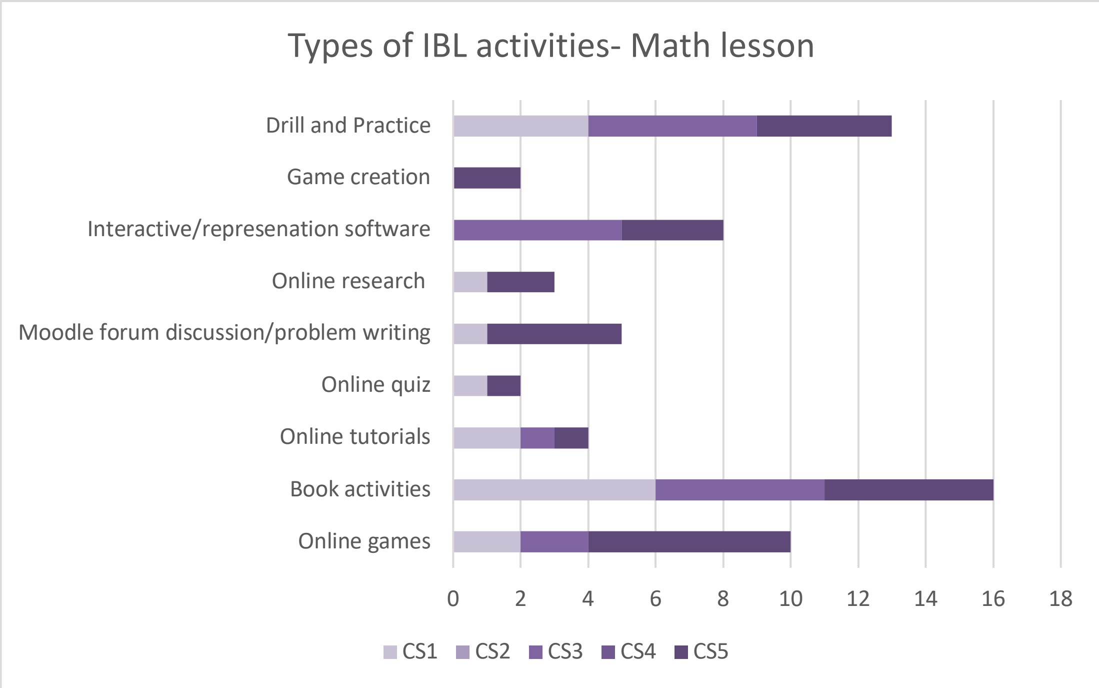


Figure 5.12. *Types of IBL activities used in the Math Lesson (CS1-CS5)*

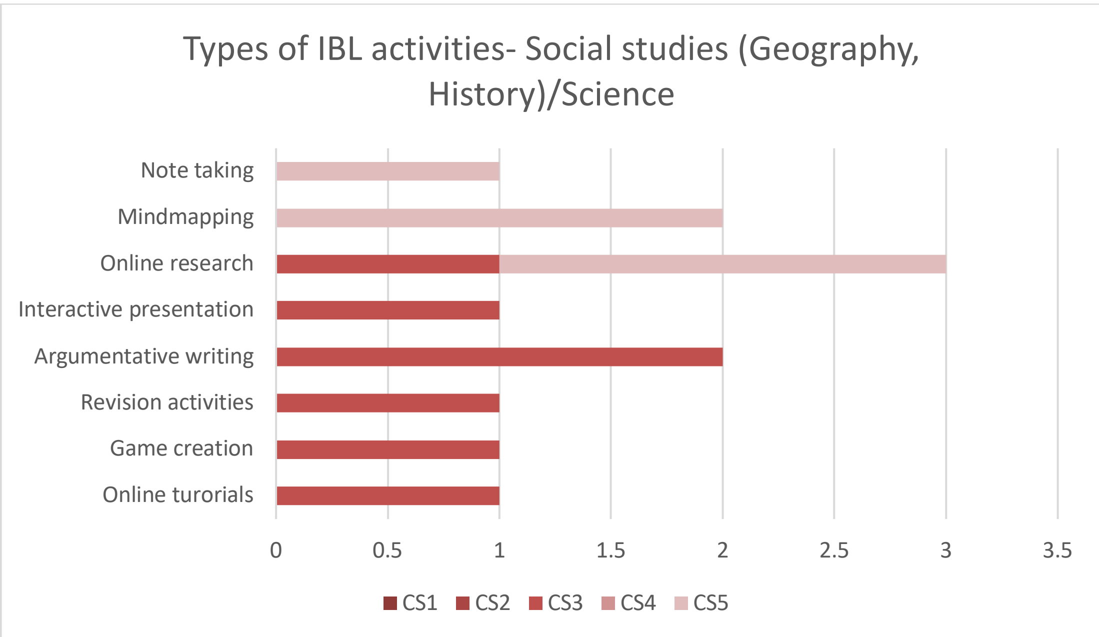


Figure 5.13. *Types of IBL activities used in the Social Studies lessons and Science (CS1-CS5)*

Students witnessed using Moodle chats '…*for discussing a topic at home or in class*' (S5.6) usually in groups in order to avoid too many chat-lines. '*Sometimes we would use the links on Moodle*' (S3.7), e.g. links for interactive (e.g. GeoGebra) or Drill & Practice Mathematics applications etc.

However, the most effective activities for upper-primary students (CS3-CS5), based on the teachers' own experience, have been the online research following a flip, highly used both during the Greek language lesson (see Figure 5.11) as well as the Social Studies and Sciences (see Figure 5.13). Students confirmed that *"… we learned how to conduct research and be little young researchers ourselves' (S5.15).* However, teachers of lower-primary students (*Tesa*'s and *Rosemary*'s classroom) believed that due to the young age of their students, they requested for more guided research, sometimes using Web-Quests. The young age of the students has not always been a limitation though, e.g. *Tesa* organized a virtual reality lesson, similar to the one *Mary* had organized, both uploaded on Moodle. Students were thrilled and have used Google Expeditions, evident in their e-portfolios (see Figure 5.14) and in their quotes:

> '*But are you in New York now? Perfect! (T). The students 'are' on Ground Zero in New York. They take a tour in New York before they focus on the island where garbage collection is done.'* (CS1-16112017)

Student research results were mainly used for proceeding into more creative activities, building multimedia, especially in the Greek language lesson, as illustrated on Figure 5.11. '*The preparation of Google Slides excited students, and also video and game creation triggered them the most*' (*Tesa*).

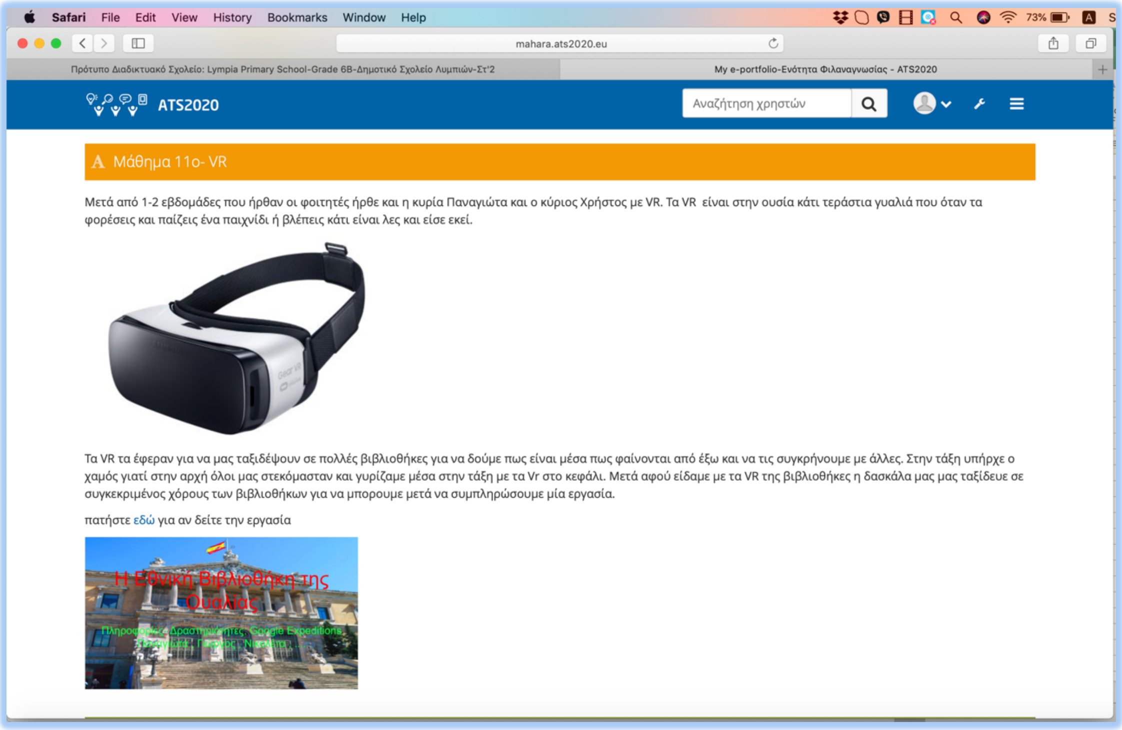


Figure 5.14. *E-Portfolio development following a Virtual Reality IB-FC Lesson (Mahara platform)- CS5-Screenshot*

Teachers believed that the use of the Google Drive through a common student account supplemented the use of Moodle in the best way in assisting implementation, since flips and students' work was shared at any time during the learning process. Moreover, teachers found it useful for students who did not have Office 365 downloaded on their device, either at home or at school, to use Google Docs, Slides (see Figure 5.15) or Sheets.

> '*The most positive aspect of creating a shared Drive is that the students can start working in class on a Google doc, for example, and continue on the same document from any other device, individually or in groups after class.*' (*James*)

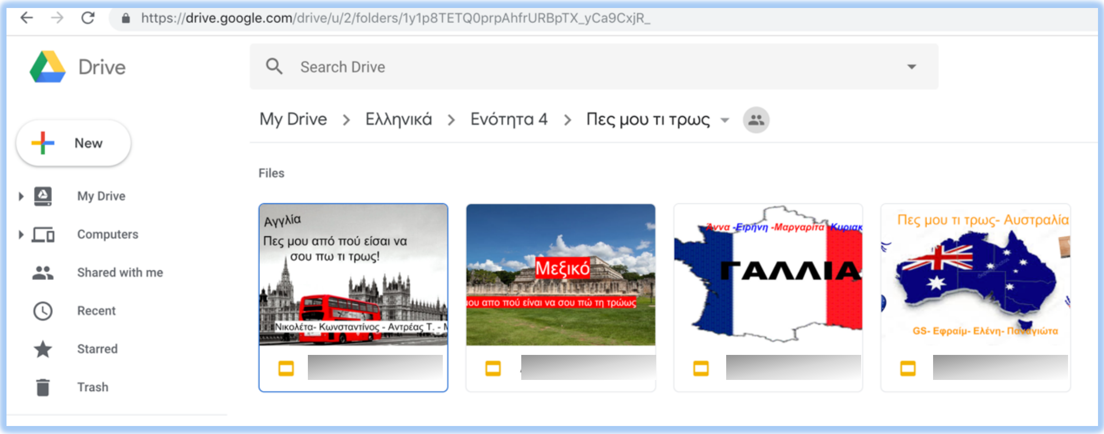


Figure 5.15. *Example of Google Slides use on Google Drive- Screenshot*

Creativity was also enhanced through '*the use of avatars to prepare weather casts'* (*Tesa), '*online debates on Google Doc*s*' (*Ben*), '*preparing e-portfolio pages and blogs*' (*Mary*), '*creating videos'* (*James*) and many others used by the teachers '*according to learning goals, readiness level of students through the flips, and time*' (*James*). Sample lessons and the lesson plan analysis showcased many more of the activities, especially in group activities. '*Students also always enjoyed working in groups in any kind of activity. We usually had students in pairs as they worked better.*' (*Mary*)

Considering students, they preferred working on their devices rather in their exercise books. For example:

'The students are feeling disappointed since they cannot use the tablets.' (CS2-22012018)

Many (n=57 out 77) also liked writing on the tablets instead in their books/notebooks because it was fun, their hands did not hurt as they said and the device could correct their spelling mistakes, e.g. *'The opposite, because it's easier to write on the tablet… It was more relaxing, more joyful.' (S4.15*). The students' excitement in using their devices, despite the challenges, was also evident in the following quote (CS3-01122017):

> *The students actively participated in the Geography lesson (using their tablets). 'They always felt excited to work with a tablet even before the lesson began.'* (T)
>
> '*Will we write on the tablets or on paper, because I don't like my handwriting…with tablets? Oh yesss.'* (S)

This did not mean that students did not enjoy using online resources, whether they found and assessed them themselves or given to them on Moodle. For example, students liked *'…that we were searching and finding information in Wikipedia.' (S4.23); 'And (doing research) from the sources of protyposxoleio [Moodle].' (S4.18).* Examples from observation notes include:

> '*The students get excited. Some students keep playing the math game and the teacher asks them to set the volume down.'* (CS1-29032018)

> '*The children get excited, one of the kids says that it is like they are having a party*,' (CS3-01122017)

What was fun for every student, evident in observation notes such as the one above, were the video games which substituted traditional in-class activities together with tablet and Moodle use: e.g. *'It was fun…because it is something* *different for us, after 5 years, being able to work with tablets during the lesson'* (S5.13)*; 'I liked that we talked about things we didn't know, it was different learning them by using the tablet'* (S2.7). Students also liked listening to music in class (e.g. S3.5), completing or creating their own online quizzes, e.g. *'Ohhhh yes, Kahoot'* (S3.8), puzzles, crosswords or board games.

Teamwork

Most students preferred working in groups since they could combine their personal input from the flips they have watched at home and complete in-class activities more easily. They also suggested that they should cooperate even more with each other so they can share the work load and have improved outcomes in lesser amount of time. This has been evident in many quotes (n=18), such as:

> *'Depends on what but I usually prefer teamwork… if we have to do lots of slides, I don't think I could do it myself, someone would have to help me and give his own ideas from the flip.' (S5.17)*

What was also clear in quotes similar to the previous one (n=15) is that students do not like the ones who do not participate in the teamwork, and would rather work on their own, for example:

> *'I prefer teamwork buuuuut…there are a lot of people in class, actually 2 people that when you have to work with them, you're the only person that is going to do the work.' (S4.12)*

Teacher support and feedback

Both classroom observations and interviews indicated that teachers were always 'on the move' during the in-class activities, e.g. '*Basically I would go around in the classroom and check that they're actually working on the task they have to do'* (*Tesa*). One of the strategies adopted by *James, Ben* and *Mary* have been the presentation of the online students' work by the students themselves to the rest of the class, receiving immediate feedback both from their peers and the teacher.

> '*Usually a third person or one of the two in the group would take notes and make corrections on the final work after, before final submission or correct them in real time on the Google doc.'* (*Mary)*

Tesa and *Rosemary* felt stressed to try out this strategy as their students were not competent keyboard users. Therefore, they adopted more simple approaches, shared by all teachers, such as giving feedback on the drafts '*with an emphasis to use whatever was initially taught in the flip'* (*James*). Moodle grades followed after final submission of their work.

5.1.3 After-class (IB-FCs evaluation).

After-class defines the time when in-class activities are completed and evaluation follows, either through further assignments, e-portfolio completion or formal assessment. Here I will present the two themes drawn from my analysis of the after-class time experiences and these include: (a) after-class assignments and support; and, (b) assessment and evaluation.

(a) After-class assignments and support

As the Tables indicate (Table 5.3, Table 5.4), most of the students reported that it is easier for them to complete their after-class work/extra activities now since they have the pre-class videos (flips) available. E.g.: '*Because our teacher will not upload something we don't know. She explains to us while we are in class and we can also watch them (the material) and we understand it .'* (S5.1)

Interview question SC.16	*'About Mahara? Sometimes, yes.' (S5.4)*
	'It has some things that are a little bit difficult.' (S4.2)
	'Not now. Before. She (the teacher) would tell us to find folders and 1000 things and we were getting confused.' (S1.4)
	'Yes, before, not now. The videos help us a lot.' (S3.1)

Table 5.3 *Student responses to interview Question SC.16: Did you have any pressure during the completion of tasks after class?*

Interview question SC.17	*'Yes! I enjoyed it!' (S1.6)*
	'Because our teacher will not upload something we don't know. She explains to us while we are in class and we can also watch them (the material) on the videotutorial. And we understand it better and we can complete our task.' (S5.1)
	'It's easier like this, because sometimes we might not understand while we're in class and then we understand and then we watch the video 5-6 times and we understand better.' (S5.12)
	'Average…Because we might get tired but we also like what we're doing with the computers.' (S3.2)
	'It depends on what we have to do. Sometimes we have to do the portfolio. And that took time!' (S7.13)

Table 5.4. Student responses to Interview Question SC.17: After class, regarding your homework, was it easier with the help of the videotutorials?

Portfolio development has been the after-class challenge for students in CS5, using Mahara platform (see Figure 5.16) in which none of them liked the process because it was very demanding, *e.g. 'I didn't like the portfolios. It was a lot of work for us. We had to view all the chapters again.' (S5.10)*

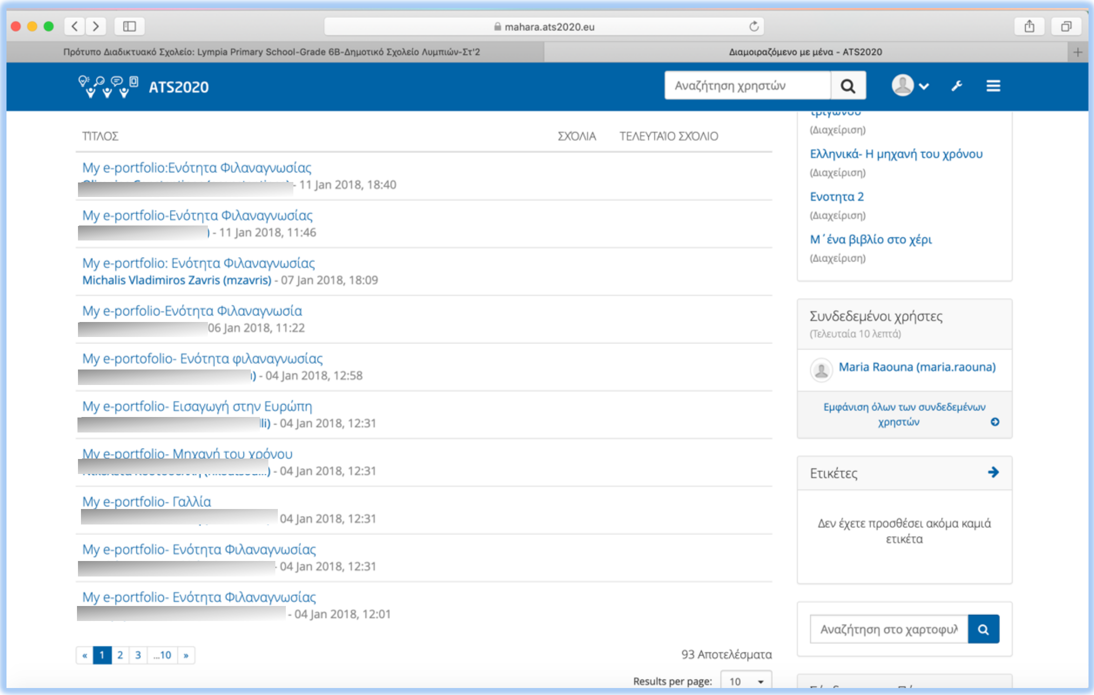


Figure 5.16. *E-Portfolio development on Mahara- CS5-Screenshot*

What also made some students in *Jame*'s classroom (n=14 out of 23) feeling stressed was that they did not have clear guidelines on a few occasions as *'… sometimes our teacher was forgetting to upload what we had to do in the homework page' (S4.13).* In *Mary*'s classroom, the teacher has created a separate '*Homework*' page on Moodle so further work at home was clearly explained. As with pre-class time, after-class teacher support was mainly offered through the use of the Moodle platform, E.g. '*Moodle chats'* (S5.17), '*Moodle forums'* (S3.8) or by uploading the correct answers so '*we could correct them and not waste time to do it in class the next day'* (S2.5). Most of the students (n= 59 out of 77) though reported that they gradually needed less help as the tutorials worked.

(b) Assessment and evaluation

Teachers pointed out multiple assessment methods applied during implementation, sometimes '…*adopting all of them according to the kind of assignment'* (*Mary*) or '…*selectively according to students' skills'* (*Ben*). Lesson plan analysis showcased that the main assessment methods have been teacher and online assessment methods (see Figure 5.17).

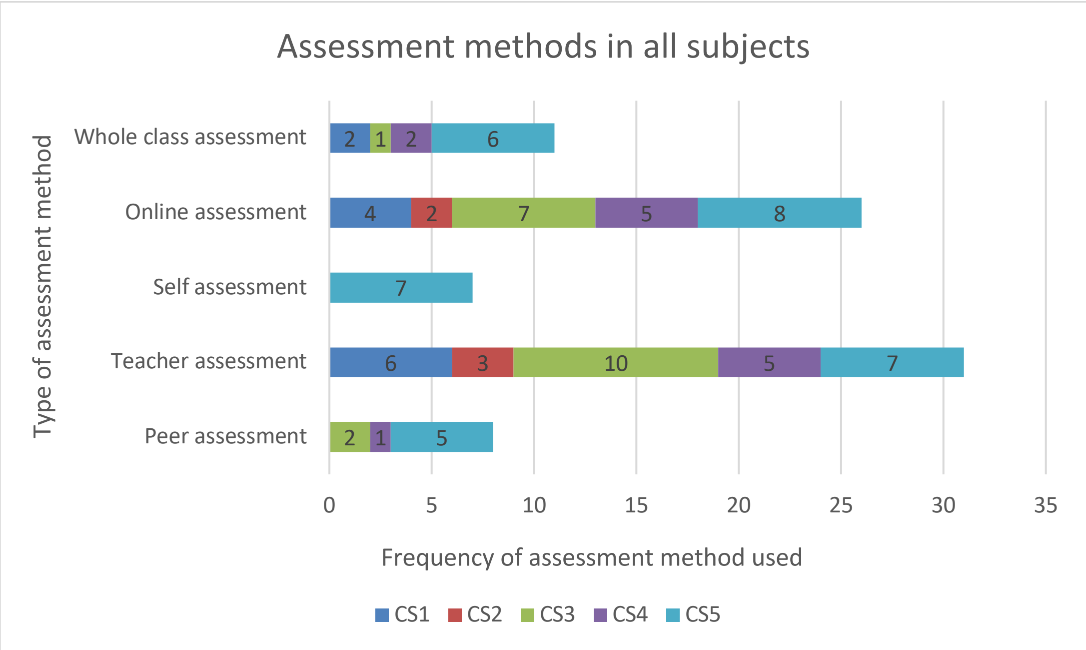


Figure 5.17. *Assessment methods in all subjects (CS1-CS5)*

Computer or online assessment methods, either through Moodle (see Figure 5.18) or other online tools (e.g see Figure 5.19) also worked for the students.

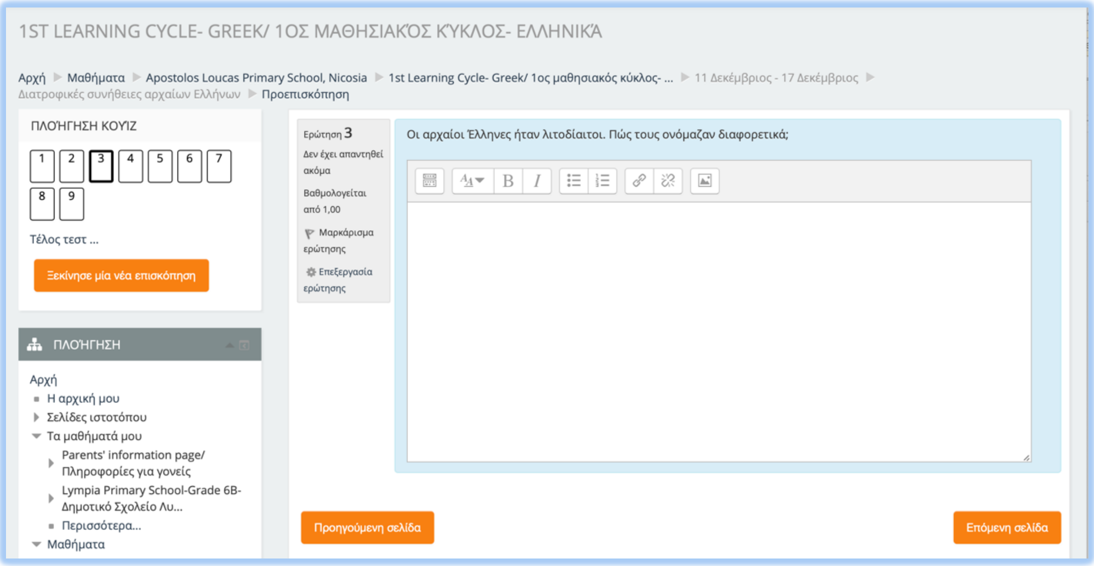


Figure 5.18 *Moodle quiz in the Greek Language (CS3)- Screenshot*

Figure 5.19. *Online quiz in Maths-Multiplication (CS4)- Screenshot*

Observation notes strongly emphasized how students get more excited with online assessment versus a hard copy, achieving high scores, also evident in interview quotes: e.g. *'We liked it better. And let's say it was more pleasant/joyful because we were feeling different from the other classrooms.'* (S4.19)

'*The students keep trying to do it. They tell their final grade to each other…they are excited. Some keep trying over and over until their grade is 100/100.*' (CS3-10112017)

Whole class, peer and self-assessment methods were also used, explained in detail together with teacher and online assessment in Figure 5.20.

What was highly important for any kind of after-class assessment method was the continued possibility for instant or real-time online feedback, '…*not feasible with paper-based assignments*' (*Rosemary*). Moreover, although there has been a lot of assessments carried out, *Ben* was right about the notion that '*We can't have a measurement whether students' work has improved but it would be very interesting if we could measure it'* (*Ben*).

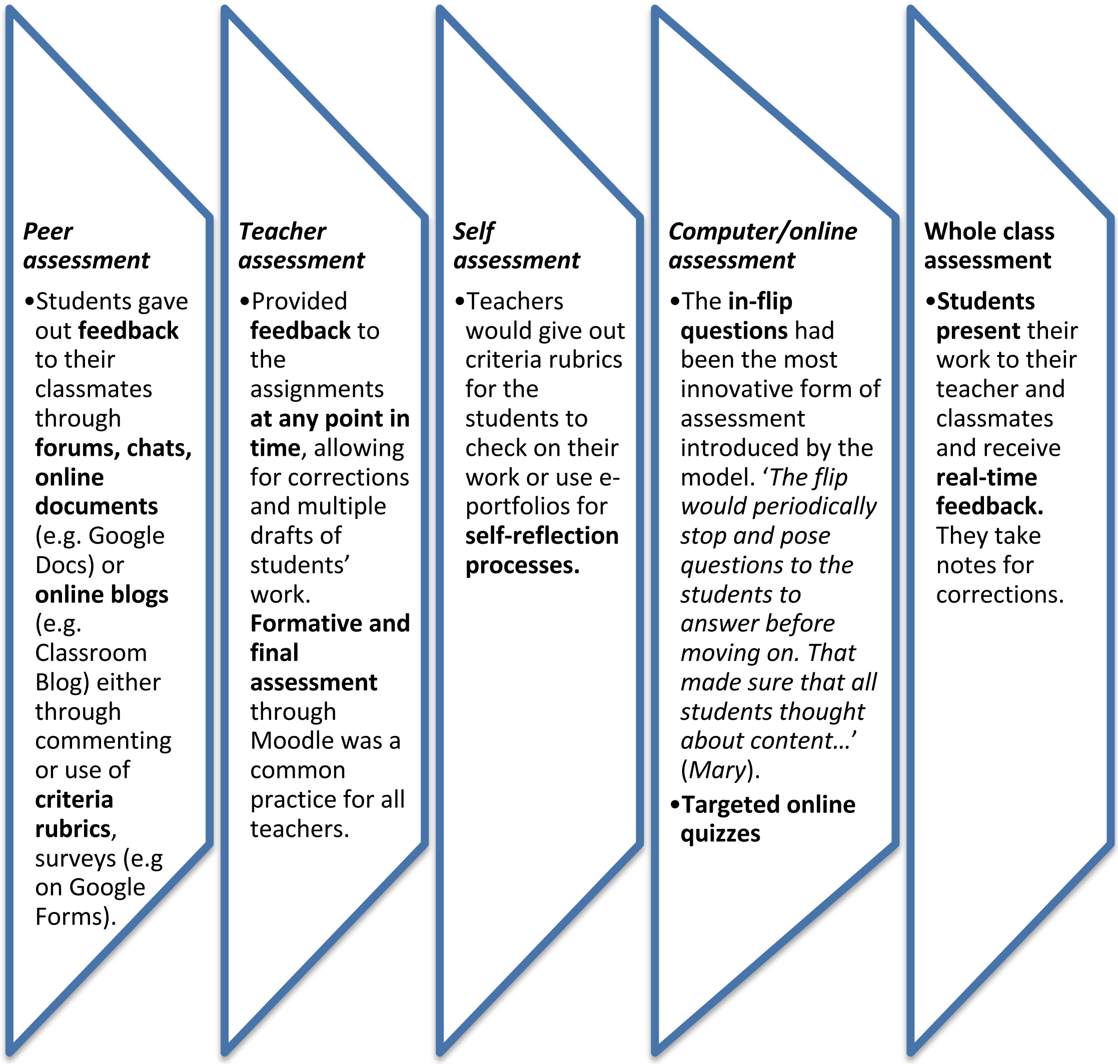


Figure 5.20. *Assessment/Evaluation Methods During IB-FC Implementation*

5.2 Teachers, Student and Parent Perceptions

5.2.1 Benefits

Here I will present the benefits of IB-FC implementation as those have been drawn from the analysis of teacher, student and parent perceptions at various stages of the model's implementation. Hence, the following six themes have arisen: *(a) The flips and work at home; (b) Student interest, engagement and* *participation in class; (c) Personalised learning and differentiation; (d) In-class time savings; (e) ICT skills; and, (f) Benefits for the parents.*

(a) The flips and work at home.

Overall, students preferred this new way of learning over their traditional class as they value the videos more than the books (n=72 out 77), e.g.: *'It was better than having a book. The video is better.' (S4.18); 'Now we learn better with the video-lessons. Now we can understand better.' (S5.14);* '*We were in a position to understand something more, a bit more every time' (S3.5).* Students also mentioned that videos do not only give out new information, they could watch them as many times at it was necessary to be able to complete their work (entrance ticket). Teachers' comments highly emphasized this benefit, e.g.:

> *'They had the flips and they could rewind me as many times as it was necessary for them to revise and understand the content…many students even reported that it was very helpful, especially during revision periods for a test.' (Mary)*

Most students (n=52) indeed liked the fact that the video was there as a reminder or a revision for a test anytime during the school year. This was also highlighted by parents (n=26 out of 41), e.g. '*They have the chance to watch over and over again till they fully understand them' (P5.14)*. Moreover, students pointed out the benefit that information '…*is presented in a different way*' (S1.4) and the value of having the teacher at home where '…*it's also quiet' (S5.16).*

Some of the teachers stressed the fact that students can create their own digital work (*Mary's and Ben's classroom*) or e-portfolios (*Mary's classroom*) with information they would gather, related to the flip, either at school or in their free time and therefore '*attain deep knowledge and also be prepared for any type of assessment on this content'* (*Ben*). Some parents (n=8 out of 41) also had confidence that their '*children can actually do their homework faster, more freely and with enthusiasm.'* (P3.3)

This was particularly important, especially for subjects taught only twice a week (e.g. Geography, History), as teachers underlined. *James* gave a strong example of this:

> '*And when I ask this student if he remembered what we've said, he said: no I viewed the presentation again and it helped me. So he had it in his mind to go and find what he had to study for completing the task.'* (*James*)

Overall, the students thought of the flips as a very good way to promote and improve their own participation in the lesson because not only did they enjoy the lesson more, they also came-in more prepared, e.g. *'…now with the tablets all the students participate and raise their hand.' (S4.18)*

From the parents' perspective, they wrote of how much the flips attracted their children's interest and that they get to understand the lesson better since they enjoy it more, e.g.:

> '*My opinion is that it is a good chance for the kids to learn better through a different way of teaching which it's more like them since they use technology a lot.'* (P5.16)

Consequently, in their responses, important concepts appear in regards to the use of the flips such as: '*personalized learning*', '*self-action*', '*they control the way they learn themselves*', '*visualized, practical way of learning*', '*moving beyond the boundaries of a traditional class*'. The parents believed that the flips not only benefited their children but also themselves as parents as they could watch the flip and learn about content and methodology of the lesson and be more prepared to help their children '*in the right way*' if needed. Parents also spoke of how their children enjoyed the activities and had an increased interest in doing their homework (e.g. P1.2).

(b) Student interest, engagement and participation in class.

James' and Mary's students (n=25) reported how easy everything was as they had teachers' support in class, *e.g. 'It was easy! Most of the times we did most of them at school, because our teacher wanted to see if we had any questions, so we only had a few things at home, easy things' (S3.9),* and all the details and guidance for the activities was also available on Moodle anytime.

Indeed, various statements have validated that teachers thought of this new methodology as an approach to attract students' attention and elevate motivation, since they are asked to function just like in their everyday life: use of visual aspects and access to electronic devices. Many students (n=28) even said that they would like to work in this way in all subjects, e.g. *'Yes, we want to have all the lessons with protyposxoleio [Moodle] except for P.E. It would be nice for the Art lesson as well' (S4.21).*

In addition to students emphasizing that it is useful (n=62 out of 77) and helpful (n=49 out of 77) to work this way, they also said that no lesson time is wasted and it is a lot of fun (n=72 out of 77), e.g. *'Because we weren't holding books, we were holding tablets'* (S2.13); '*For not getting bored…because it is more boring to read from a book whist reading from the tablet it's more fun! (S4.20). Observation notes evidenced students' interest further:*

> '*The students show a lot of interest throughout the whole lesson- they look at the work and their peers, filling in the quiz on the missing sentences and watching the uploaded videos.'* (CS3-01122017)
>
> '*The students raise their hand and give out answers. Almost all of them participate and answer correctly. …As soon as the teacher demonstrates the next activity, the children concentrate back to the lesson at once.'* (CS5-16112017)

Teachers insisted that students' benefit should be viewed from different levels. Figure 5.21 summarizes teachers' views on students' benefits on a practical and theoretical level.

Thus, on a practical level, students were encouraged to self-activate and *'…this is very important for them, being responsible for what they are going to learn…it helps them to grow up and perceive the actual meaning of schooling and learning in a different way*' (*James*).

The young age of the students set the challenge on how to avoid their confusion throughout the model while engaging them into the learning process more, as *Mary* noted.

Level 1- Practical

- Meaningful activities
- Adapted activities to students' preferences (video, audio, text)
- Interactive activities
- Immediate feedback
- Familiar way of working (technology at hand)
- Instant access to teacher and teacher comments
- Preparation from home

Level 2- In theory

- Students come to school and know the focus and the subject to be taught
- Students have already a list of questions to be answered/clarified in class.

Figure 5.21 *Teachers' views on students' benefits from IB-FC Implementation*

Observation notes showed than even the weakest students, or students from a different culture and language were persuaded to participate. For example, S3.2 is a foreign student, with many language problems:

> '*S3.2 participates in the lesson (he is not participating in most of the lessons). …S3.2 pops up and asks if sprays spoil the atmosphere. The teacher praises the question and says that they will look into that in another lesson…S3.2 asks the teacher if he will upload the video the teacher played a few days ago in the classroom on the platform.'* (CS3-19012018)

Parents also agreed that students' engagement was highly encouraged, e.g. *'It attracted a lot of my child's interest and it was a motive so as to combine learning with something new and innovative.' (P3.1)* A prevalent comment in their responses (n=27 out of 41) was that the practice constitutes a modern learning model which is in line with the everyday life of contemporary children, e.g. *'Alternative learning for the children giving them the chance to learn though internet moving along with the times.' (P2.2)*

Among the benefits, parents believed that students' critical thinking is encouraged through interesting, innovative activities. Many (n=25 out of 41) agreed that this in turn led to enhancement of collaboration, as it '*teaches children to work as a team…*' (P1.1), their children pay more attention to the lesson as '*they understand it better'* (P4.12) and '*it gives a meaning to what they are doing.'* (P5.3)

What was also vital is students' consistency and level of responsibility, especially during pre-class *'…if we are to enjoy the benefits of the model instead of exerting pressure on the lazy ones to do their work'* (*Ben*), as discussed in the previous section. If everything functions well in the model, then the theoretical benefits also become part of the practical benefits. Classroom investigations have shown that students learn to multitask, combining this set of benefits:

'*The students pay attention but also have the website open on their laptops.'* (CS5-16112017)

(c) *Personalised learning and differentiation*

'*As teachers, we have long strived to maintain what is called 'personalised learning' and 'differentiation'. It's a huge challenge, somehow I feel made more possible with this methodology'* (*Mary*). Whilst discussing this issue with the teachers, they all referred to the added potentials of the model such as '*immediate feedback'* and continuous comments on students' work through the teacher's and peers' assessment, which could in turn improve study outcomes. Saving class time also offered teachers the opportunity to work closer with the students who needed further guidance and assistance with the new and more complicated concepts introduced.

Ben strongly emphasized that '*If there is a communication canal with the parents to know that you do something specific for their own child'* and cooperate more with them through this methodology, we could have better results towards '*personalized learning'* and '*differentiation*'. All teachers agreed to that!

Moreover, positive perceptions of the parents did not only involve enthusiasm on the lesson being done 'differently'. Parents also shared confidence that '*All students can benefit from this (IB-FC model), either they are top students or average students*' (P5.4). Therefore, parents spoke of the '*added-value of technology'* (P5.11), the gain in time '*since the children know from before enough about the lesson*' (P2.3) and the fact that their learning is not confined to the walls of the classroom, e.g. '*Very constructive way of learning which* *engages the students more actively*' (P5.2). Lastly, they recognized that such a methodology can cater varying learning types and therefore *'…It suits more to my child's way of learning*' (P5.2) because '*Our child work more freely and cooperate more with their classmate*s' (P3.6). Even the students appreciated the educational value of the model, e.g. *'We get more help in understanding the lesson' (S5.17).*

(d) In-class time savings

Mary gave great emphasis to how the model has helped her in organizing a lesson in a way that maximizes classroom time.

> '*It is important to gradually try to give it to them 'the lecture' in alternative ways other than just standing in front of them talking or illustrating a presentation.'* (*Mary*)

One of the main potentials of the model was to free additional classroom time through the flips in order to concentrate more on IBL activities. Did teachers believe that there have been indeed savings in classroom time? Teachers (*Tesa, Ben, James, Mary*) claimed that there were occasions when time was indeed saved, especially in terms of giving feedback to students' work, either pre-class or after-class. Teachers usually assessed the entrance tickets or any other kind of work the afternoon before and gave permission to students to modify their answers before coming back to school.

> '*So, there was an improvement, formative evaluation, an instant change*

and feedback in contrast to paper-based assignments.' (*Tesa*)

Savings in time also happened when students prepared at home. For example:

> *'…about what was going to happen the next day at school. So, from the beginning of the lesson they had questions instead of spending 30 to 40 minutes doing the lesson introduction they had in the flip.'* (*James)*

> '*I was impressed with the fact that they already knew the content of what I've uploaded. We just did a quick revision.'* (*Tesa*).

The additional practice given for new concepts through the upload of various website links on the Moodle platform also saved classroom time. *Mary* felt so enthusiastic about it, exclaiming '*This saved in-class time and gave us the chance to spend more time together with my students in activities which were hands-on, more creative and much more meaningful for upper-level learning.'*

However, these savings in time for feedback/corrections and preparation/understanding only happened in occasions when students were engaged and responsible enough to watch the flips and complete the entrance tickets. *Rosemary* and *Ben* felt very disappointed with their students:

> '*It didn't work out. If the parents thought of it as part of the lesson, being compulsory then we would definitely have saved time because everyone would have watched it.*' (*Rosemary*)

> '…*the challenge here was precisely this, that the majority of students did not see the content at all. So, it did not save us learning time.'* (*Ben*)

Therefore, the fact that the activities were not given out in *Rosemary's* classroom as compulsory and the culture of the students in *Ben*'s classroom, who was not very engaging posed a challenge: '*There was a lot of resistance from several students to work at home, even for the simplest things.'* (*Ben*)

This did not help in saving time and work as they should have been within a FC model. There have been irresponsible students in *Tesa's, James'* and *Mary's* classrooms as well but those have been the exception and the teachers dealt with it accordingly.

(e) ICT skills development

The students in this research could be divided into two groups: the ones which have previously used technology in their learning and have well-developed ICT skills (*Mary's classroom*) and the ones who worked with technology in class for the first time (CS1-CS4). Obviously, *Mary* talked of how easy it has been for the students to adapt to this new learning methodology, but at the same time how their ICT skills have developed even further.

> '*It's been a total of two years now that we are working through a BYOD initiative. We had worked on a Moodle and Mahara platform and participated in many ICT integration programs. So, there were no limitations.'* (*Mary*)

Their e-portfolios, as *Mary* said, included a separate field where students would talk about how they personally assessed improvement in their ICT skills. That would normally include how they help each other to solve any kind of problems arising either with software or other tools. A quick look at the recorded observation video in Mary's classroom confirmed the high level of ICT skills those students have developed. For example:

'*The students prepare the PowerPoint presentation that they will use in their videotutorial. They use the internet to find images for their PowerPoint presentations. The teacher has asked them to use wording and pictures in creating their own video on unit fractions.'* (CS5-17012018)

'*Some students are trying to open both windows, some others are trying to download the software. Some students work in pairs and have the MindMaple on half screen and on the other half they have the video playing; The students have the Drive and their mindmaps open so they announce what they had noted on the mindmap.'* (CS5- 21112017)

The few afternoon inquiries the students had, as *Mary* recalled, usually involved teacher mistakes of either forgetting to post the homework or if there was something wrong with the flip or the link given for pre-class work and they would ask for guidance.

Teachers in CS1-CS4 shared a common experience, i.e. students starting from point zero in their ICT skills (n=62 out of 77) and developed as implementation proceeded. This set limitations to the kind of tools teachers were using and the pace of integrating IBL activities in class. A gradual improvement in their skills assisted towards a more efficient integration as the school year progressed.

The same applied with some of the parents. The teachers witnessed that they would listen to some of their students talk of how their parents could not log into the platform prior and therefore could not help them out. However, many of the parents (n=29 out of 41) who talked of the benefits arising with the development of the ICT skills were positive about their children continuing to work in this way, extending the model's implementation in all subject matters at primary and even secondary level, e.g. '*It would have been good to have it in all other lessons as well since it helps the child to gain skills and acquaintance with learning with computers.'* (P2.1)

The quote from the interview with *Tesa* summed up everything the teachers have said about ICT skills development:

> '*Firstly, you can observe how easy it's for them now to log-in on the platform and find the lesson. It's a skill that my students didn't have. We began from zero, so being able to do this, for me this shows progress. From that point on, they have developed skills that are related to using Word, to type their answers in the forum, to being able to post something… I think that they have a long way to go, they are not yet aware of the range of possibilities and benefits arising from this model.'* (*Tesa*)

Students, and their parents, highly valued these skills as essential life-long/transversal skills which would not only help them achieve higher grades at junior school, but also their life as students at university and later on for their work as adults, e.g. *'I know we're all going to university so we will need to know* *how to use a laptop and the internet' (S3.7).* Furthermore, most of them (n=57 out of 71) recognized that they have improved their typing speed, e.g. *'So, we can complete our assignments faster'* (S4.15).

(f) *Benefits for the parents*

The parents recognized that the model attracted their children's interest, improved their understanding, their ICT and cooperation skills. They also believed they have benefited themselves through devoting and spending more of their personal time with their children, advising them or cooperating with them at various stages of their work, e.g. '*I come to a closer contact with what my child is being taught*' (P2.3); '*It was very useful for the children, even for us the parents. We could explain to the students the right way they could do their work'* (P5.10), both becoming more creative. Many of parents also spoke of how they '…*get to learn as well along with my child'* (P1.3), and how they developed their own ICT knowledge and skills. One parent mentioned: '*It helped me in creating my own blog which I have used it for my work'* (P5.2). The program has also assisted some parents in checking if their children have done their homework and gradually developing their trust towards them in using the internet correctly for their education, not just gaming.

5.2.2 Challenges and limitations.

In this section, the challenges and limitations will be presented, separated into three themes: (a) Age and skills of students; (b) Unsuccessful activities; (c) Technical aspects; and, (d) Parents' concerns.

(a) Age and skills of students

The young age of the students and their limited skills posed challenges and set limitations during implementation, especially at the early stages. A major issue in the beginning was the difficulty to log in to their Moodle account, i.e. typing in correctly their username and password, leading to disappointment, e.g. *'Well sometimes some students hurry to log in and they type their password in a wrong way and then our teacher helps them and they log in' (S3.8).* This was confirmed in the teacher reflection notes and the observation notes during the first three months, for example:

> '*The students are having difficulty in entering their codes on Moodle. They try to help each other. They show each other what to do on the tablet, where to press and write*.' (CS1-2112017)

Furthermore, students did not feel very pleased when they needed guidance in using particular software, e.g. observation notes indicated some challenges in using MSWord:

'*Some students have a hard time to write in Word since they didn't know how to change the language. They ask other students though and they try on their own after.*' (CS1-02112017)

Overall planned IBL activities didn't always work as expected, especially with the lower-primary students (*Tesa's & Rosemary's classrooms*), either because they wouldn't all watch the flips or understand them well, or because they both lacked ICT and IBL skills required, e.g.:

> '*There were some scheduled activities that I wanted to do but they didn't work out because the kids are inexperienced, and it was very difficult for them to respond so we didn't do them at the end. Like for instance to create a newspaper when we had a lesson about article writing. It was very demanding, so we dropped it.'* (*Tesa*)

Common class accounts were created so that the young students could easily remember the same code for all applications and share their work easily. Although common accounts were very convenient, they usually caused problems when the program did not allow multiple logins, e.g. *Voki* (http://www.voki.com), causing students' dissatisfaction (n=14). E.g. *'I didn't like it when only a few people could use a program, like Voki. Only 2-3 people could use it.'* (S2.19)

'*The students got excited with Voki but felt upset after because they couldn't use all the avatars available.*' (CS1-02112017) *(b) Unsuccessful activities*

The age of the students was not the only reason for unsuccessful activities. As previously explained, long flips and activities pre-class (entrance tickets) were disliked by all students who would prefer shorter and less complicated work. The same applied for parents who sometimes neither had the skills or the time to offer guidance to their children. This sometimes led to unfinished work, misconceptions and disinterest. The challenge was then transferred to the in-class teachers who had to deal with disengaged students, also discussed earlier.

Almost half of the students in Tesa's, Rosemary's and James' classrooms (n=21) perceived the in-class activities as challenging and very demanding, e.g. *'If we were confused at some point we had to start over, watch the video from the beginning and it was difficult.' (S4.8)*. Classroom observations and student's accounts have shown that students would get bored with long videos in class:

> '*The students are watching the video carefully even though some seem to feel bored.*
> *Some of the students start talking to each other. The rest of the students continue watching the video carefully. The students start talking to each other and the teacher asks them to watch the video.'* (CS1-17032018)

However, it *'Depends on each person, because some might not remember the video while others might remember more'* (S4.18), as another student emphasized. The main thing which was difficult for the students in *Mary's* classroom was the connection of the Moodle with the Mahara platform for the development of e-portfolios or IBL activities, e.g. *'Mahara is very difficult…we had an assignment to view 10 libraries and write 10 questions for the library we would visit. It was a difficult assignment because we had to find specific information… .' (S5.13)*

(c) Technical challenges

Devices and internet use at home

Participant teachers were very happy to have faced only minor technical challenges (availability of devices and internet connectivity) at home during implementation. In particular, *Rosemary* and *Ben* felt pre-class implementation was straightforward since all of their students had a device to work with at home. *Tesa, Rosemary* and *Mary* had a couple of students who needed to borrow school devices and these were given out with no difficulty.

Even though almost all students had a device to work with, issues like the following sometimes arose, making things more challenging the day after for the teachers:

> *'…No they had a device but sometimes one would say that Miss my tablet is not working, another one would say: my parents have hidden my tablet because I play on it for too long and they won't give it back to me…so we had that kind of problems as well.'* (*Rosemary*)

-*Did you watch them?*

-No Miss! My dad wouldn't let me because the tablet was banned.' (CS2-22012018)

So, in cases like that, the students had no option but to watch the flip in class, using their headphones (*Rosemary's classroom*).

Although most of the students confirmed that they enjoy their work at home and denied having connectivity problems, there have been indeed some issues as parents confirmed. For example: '*Yes, sometimes problems with the internet or some problem with the computer has caused a delay in completing the work. In cases that she couldn't work, we would notify the teacher accordingly*' (P5.9). It is important to note that when connectivity problems occurred at home it would not take long to fix, avoiding students to stress over the work that needed to be done. E.g. *'I was getting angry with the internet. But when I had a problem I would call my mum and my dad and they would fix it for me' (S2.2)*. In such cases most of the students tried to somehow inform the teacher for not being able to complete their work '*so as to avoid possible penalty points…I never got one really'* (S1.14), whereas connectivity problems at home for *Tesa's* students were easily solved, since students could study at school during the afternoon-session (S1.4). This reduced students' anxiety over pre-class activities (i.e. entrance ticket).

There have been though instances when teachers clearly perceived that some students tried to use bad internet connection at home as an excuse of not completing their work, e.g.:

> ‘*No, no excuses they couldn’t provide excuses anyway, because when they were coming and they were saying: I was playing an online game on my computer, they couldn’t say I didn’t have internet at home. They all had, they just didn’t do it. It was a matter of disinterest.*’ (*Ben*)

A few of the students were getting anxious when they would forget their charger at school (S3.9) or would face compatibility problems. They felt lucky though that Moodle worked on all smart devices, as one student explained, *‘I couldn’t do it with the laptop and I was using a phone… .’ (S2.17)*

Internet safety has also been an issue of concern for a few parents (n=9 out of 41) who sometimes enjoyed the chance to guide their children towards the right use of it, e.g. ‘*Occasionally I would offer help with the use of the internet. We had discussions about the right use of the internet and the use of the technological equipment. I liked this chance which was given to me a lot*’ (P5.2).

Devices in class

As one of the teachers noted:

> ‘*In comparison to 10 years ago we have solved our technical problems, all students have a device they can use to go online, or anyway most of them have the technological means and now we focus on what works or doesn’t work regarding the students themselves.*’ (Ben)

Indeed, all students in *Mary’s classroom* would bring their own device to class whereas the rest (CS1-CS4) mostly used the school's tablets. Additional devices were used if needed, e.g. For *Tesa's classroom*, the researcher provided two tablets whereas *Ben* noted that '*7-8 students from the 23 brought their own devices to school'*.

Teachers agreed that students who brought in their laptops (*Ben* and *Mary*) worked better than the ones working on tablets. Teachers who worked with tablets (*Tesa, Rosemary, James*) also mentioned that they would prefer to use laptops with their students.

> '*It is easier to type on a laptop keyboard, easier to have many windows open, to create a presentation and also everything works on a laptop. I would sometimes design a lesson with some games for Maths and they wouldn't work on tablets.'* (*Tesa*)

> '*Luckily enough, Moodle works on any device…we had students with tablets and I wouldn't want to keep asking them to get in pairs with the students who had laptops because that happened a lot when we used other software not compatible on tablets.'* (*Mary*)

In fact, some *tablet students (n=14)* reported having compatibility problems, e.g. *'Sometimes I cannot open some webpages on my tablet and I have to do it on a computer or do it at home.*' (S5.7)

'*Miss, I tapped on it (the video) and it wouldn't show up anything'* (S-CS2-22012018).

No-one working on laptops pointed out any accessibility or problem with his device, e.g.:

> 'Me*, in the beginning when this thing begun, only had my tablet and it was a little bit difficult, because with the tablet it's different rather than with the computer. It was better on the computer, easier. My tablet also sometimes would crash, freeze… I had some problems. Now I use a laptop.*' (S5.2)

> *And the lesson would be better and more fun if we didn't have some people without computer because with the computer you can use all sites.*' (S5.9)

This was one of the main reasons that students preferred to bring in their own devices: not only to make sure that they have no problem with the school device/tablets but also to keep a level of continuity, e.g.:

> '*When we were cooperating on a project in class we were using our teacher's tablets…and sometimes we couldn't complete our assignment at school and so we had to start over and complete it with a different tablet at home.'* (S4.20)

This was one of the reasons that Mary employed a BYOD program and in that case '…*some people don't bring laptops and you have to work with these people and this is a little bit difficult, because they might not be working with you*' (S5.12). Such complains about lack of cooperation have been intense (n=14 out of 17), followed by complains about unfinished work, e.g. '*You might* *leave the assignment for the other person to finish it and you come in the next morning and the assignment is unfinished*' (S5.1).

Another criticism regarding the BYOD in *Mary*'s classroom was about the daily transport of laptops to school (n=5 out of 17). The students complained about the weight of their school bag and therefore suggested that they should either have lockers at school for keeping their books in or they could have their books in digital form, e.g. '*It would be better let's say if we could have the Greek books on our computer, then it will not be necessary to bring books*' (S5.14). They also proposed the use of mini laptops, not tablets, which would weigh less and resolve compatibility problems of tablets. Moreover, they reported that it is easier to work on laptops and helps them to type faster, e.g.:

> '*What we said about laptops, it is more preferable because the tablets sometimes crash very easily, do not work for all the websites we want them and some of them have a small screen and for me it's difficult.'* (S5.10)

Another recommendation proposed by the parents was the use of the computer lab, if available, e.g. '*There should be a space at school which would have the computers necessary for the lesson to take place and in this way the children wouldn't have to carry their own personal computer with them.'* (P5.5)

Rosemary believed that it may have been better if all students have brought their own device to school so they could have ownership and treat it like one of their books which they had to open again at home and work in. She claimed that students would therefore be more responsible in doing their work. No matter what the benefit was, she sadly said that when she proposed it to the headmaster, he was negative about it:

> '*My headmaster reacted negatively. He is very open-minded but he was not at all positive in agreeing to bring their own device to school. The parents would have probably reacted as well. They do regard it as a learning tool but they are skeptical regarding the safety of the device, if they will lose it, who will look after them.'* (*Rosemary*)

In-class connectivity

'*The students shouted out that there was no WiFi connection and have lost their temper'* (CS2-23112017).

Periodic problems with internet connectivity in class, either due to slow connection or no connection at all, have been the main challenge reported (especially in *Rosemary's and Ben's classroom*, eg. CS2-22012018). *Rosemary* had many technical support and connectivity problems, being the main reason as she explained, for the poor implementation of the model.

As *Rosemary* underlined:

> '*We have tried to use the chat in the classroom one day but we didn't have a good internet connection. We had to cancel for 2-3 times the planned activities.*' (*Rosemary*)

Both Rosemary and her students talked of how there was a waste of valuable learning time trying to reconnect to different networks and failing every time and how they felt frustrated: e.g. *'Sometimes the internet is on and off…it drives me crazy' (S2.12)*. Many of the students in *James'* classroom, agreed to this also *(n=18 out of 23), e.g.:*

> *'We waste our time because it doesn't work (the tablet) and we waste time off our regular lesson.' (S4.18)*
>
> *'We have a slow connection because we only have one router and we are too many in the class, we have lots of devices and the internet gets slow, and we waste our time trying to connect.' (S4.12)*

'*The students shouted out that there was no WiFi connection… The teacher decides to process with another activity since there is no good connection. The students are feeling disappointed* (CS2-22012018).

Tesa, *James* and *Mary* did not mention such big connectivity problems in class. Power supply cuts were in fact a challenge when construction works were in place in Mary's classroom, e.g. *'We had a power supply problem for a couple of months. So, the internet was sometimes on and off' (S5.13).*

(d) Parents' concerns

Parents were overall concerned about the use of the internet, necessary for the implementation, in many aspects: (a) connectivity: the need for a good connection; (b) safety: the need to avoid internet dangers; and, (c) information:

the need for developing critical thinking. They also pointed out several issues and concerns regarding the use of the computers, such as: (a) availability: the need for a device at school and at home; (b) interactiveness: the loss of direct communication; (c) health issues and, (d) addiction.

In particular, many parents (n=25 out of 41) underlined that the weakest part of the program was their children spending too many hours on the computer/device, increasing their total screen-time. They associated this with the possible development of eye problems since they believe that *'…the students are trapped with the computer*' (P5.10).

Some parents also stated the importance of *'…not isolating the traditional way of teaching'* (P5.1) and therefore IB-FC *'…should not be used very often'*, as one parent stated (P2.8). This was because parents say that '*it puzzles us in relation to high-school next year*' (P5.13) where a more traditional teaching model is used. Thus, regardless of how the platform has been used, some parents in Mary's classroom (n=5 out of 17) asked for a combination of the model with traditional teaching since the model had been implemented extensively in all subject matters, unlike in the other Case Studies of the research. '*The new way should not outweigh the old way, not because it is not good but simply due to how the Cyprus educational system works following the traditional way, especially in high-school*' (P5.1). Another concern was '*to exercise more in traditional writing tasks* (P5.12)', writing longer essays using their exercise books (in combination to the Google Drive) '*so as to exercise their spelling rules and their handwriting*' (P5.10).

> '*I think that if the implementation was to a lesser extend it would have benefited the children better. I have realized that through a conversation I had with my child. They have somehow felt tired using the computers on a daily basis.'* (P5.9)

Parents in *Tesa's and Rosemary's* classrooms were also a bit troubled about the young age of their children since a few believed that *'…older students can work better in this way'* (P2.15). Despite the challenges and the suggestions for minor improvements of the model's implementation, many parents agreed with the statement: '*I wouldn't like it to be done differently. It's just fine for the time being*' (P3.3), also highlighting that: '*It should be implemented in all the grades and subjects of the primary school in its own way, in its own right way'* (P5.13).

Chapter 6: Universal Design Principles

6.1 Introduction

Educational research is expected to give practicing educators the knowledge and the techniques to achieve particular learning goals, especially in primary education where instructors teach multiple subjects within a day and do not specialize in one field as in secondary and higher education. However, research should provide knowledge that should enable educators to deal with and approach problems they encounter in a more rational way (Biesta & Burbules, 2003). Research should also concentrate on in-class activities of the FC model, i.e. IBL, e.g. hands on activities, group discussions and online research and evaluation, and not only on the flips and entrance tickets. Hence, design principles, based on real teacher, student and parent experiences and perceptions, should be given to educators who will prepare FC lessons for a community of young learners (Loizou-Raouna & Lee, 2018b).

This is the aim of this chapter: Firstly, to discuss which UDPs should be followed for IB-FC lesson designs which could ensure an effective implementation of the IB-FC model in primary education, extracted from multiple qualitative data sources of this research. Secondly, the IB-FC instructional tools, which initially guided the teachers, will be revised and new ones proposed and explained within the discussion of each principle. The research framework will be modified and enriched through the incorporation of the revised IB-FC tools and the UDPs proposed, and will be presented in Chapter 7. Coding and observation dates will be used here as in Chapter 5.

6.1.2 Deriving the principles.

The study and analysis of the teachers', students' and parents' experiences and perceptions has given rise to particular practical suggestions for teachers (Uploaded on the research's blog: http://flippedclassroomcyprus.blogspot.com), divided into three main parts: (a) Taking initial steps for an IB-FC lesson; (b) Preparation of IB-FC lesson plans for young students; and, (c) Delivery. These were further coded and defined as IB-FC universal design principles, whilst some of them were validated through past theories and research on FC design principles in higher education (Brame, n.d.; Chen & Chang, 2017; Kim, 2016; Kim et al., 2014), multimedia learning principles (Day & Foley, 2006; Winter, 2018) and teaching effectiveness principles (Friesen, 2009; Lo & Hew, 2017; Mazur et al., 2015).

The seven UDPs (UDP1-UDP7) this study proposes will be presented next, together with the associated IB-FC tool which have been revised or newly created following the findings of the study.

6.2 UDP1: Structure and Flexibility

6.2.1 Structure.

Lesson designs should be prepared with a clearly defined structure and based on the same orchestration routines.

During the preparation of the IB-FC Lesson designs, educators should initially follow particular design steps which would ensure a clearly defined structure both for them and their young students. It is important for them since they *'[we]…have to teach multiple subjects within a day and we [the teachers] need the structure as well*' (*James*). It is even more crucial for the students since *'…they are too young to set their own learning route'* (*Mary*). As Hall and Dufrene (2016) have pointed out, instructors usually focus in the technology aspects and neglect the instructional design of the FC implementation which should be well-prepared and organized. Parents also appreciated the use of a constant space for their children to work on (i.e. Moodle).

The initial lesson template given to the teachers has been revised and includes references to the new and revised instructional IB-FC tools (see Figure 6.1). The considerable use of VLE tools is evident throughout the learning process. In this study, Moodle tools have proved valuable to the teachers: e.g. *'Always had a look at them before deciding*' (*Ben*). Indeed, a VLE/online platform is one of the essential technology tools used in past FC research (e.g. Baker 2000; Pempek et al., 2009). It elevates the possibility of achieving FC goals (Hwang et al., 2015) given its possibility in providing structured sequences of learning, e.g. upload of instructions, use of tools for entrance or exit tickets and in-class activities, supplementing with external tools and upload of content (Example given in Figure 6.2).

Template for lesson designs

A. Introductory in-class session (10')

- Attract students' attention. Set the scene for the resources and content given for study at home (E.g. video, presentation)
- E-portfolio (1st page completion) (e.g. on Mahara platform)

B. Pre-class, i.e. at home ("day- work", do not use the word '*homework*')

- Flips (e.g. video, presentation, text, online resources or a combination) (5'-10') on VLE **(IB-FC Flips tool)**
- Note taking tool: VLE forum/wiki/online document or notebook/e-portfolio self-reflection page
- Teacher support: Synchronous and asynchronous communication tools (e.g. VLE forum, wikis, chat) **(IB-FC Community tool)**
- Assessment: Entrance ticket (**IB-FC Technology tool; IB-FC Assessment tool**), e.g. quizzes, mindmaps, worksheets, polling system

C. In-class

- Lecture (5-10'): answering questions, looking at forums, notes, filling-in the gaps, clear misconceptions. (**IB-FC In-class tool**)
- Identify which students need help and motivate **(IB-FC Engagement tool)**
- Inquiry-based learning on VLE: guided and independent practice e.g. students research and create content using entrance ticket and other sources (upload on Moodle or Drive or e-portfolio) **(IB-FC skills tool)**
- Review questions
- Exit ticket or Assessment/self-assessment/peer-assessment: survey, worksheet, rubrics etc. **(IB-FC Assessment tool)**
- Closing lecture (5-10')

D. After class

- Ask them to re-watch the video or a new flip in closing the lesson at home.
- Completion of e-portfolio: prepare the final page or the e-portfolio with their reflection on the unit, incorporating learning evidence **(IB-FC Assessment tool)**

Figure 6.1. *Revised IB-FC lesson template*

The newly revised lesson template also recognizes that the completion of the e-portfolios should be an ongoing process and hence includes follow-up steps within each phase of the FC learning design, proposing the use of a structured e-portfolio platform: *Mahara,* https://mahara.org. Moreover, teacher support through a variety of synchronous and asynchronous tools has been added and the learning process in-class has been revised (reversing mainly the point of identifying students which need help at an earlier stage in the learning process) in line with the IB-FC In-class tool, explained later in this chapter.

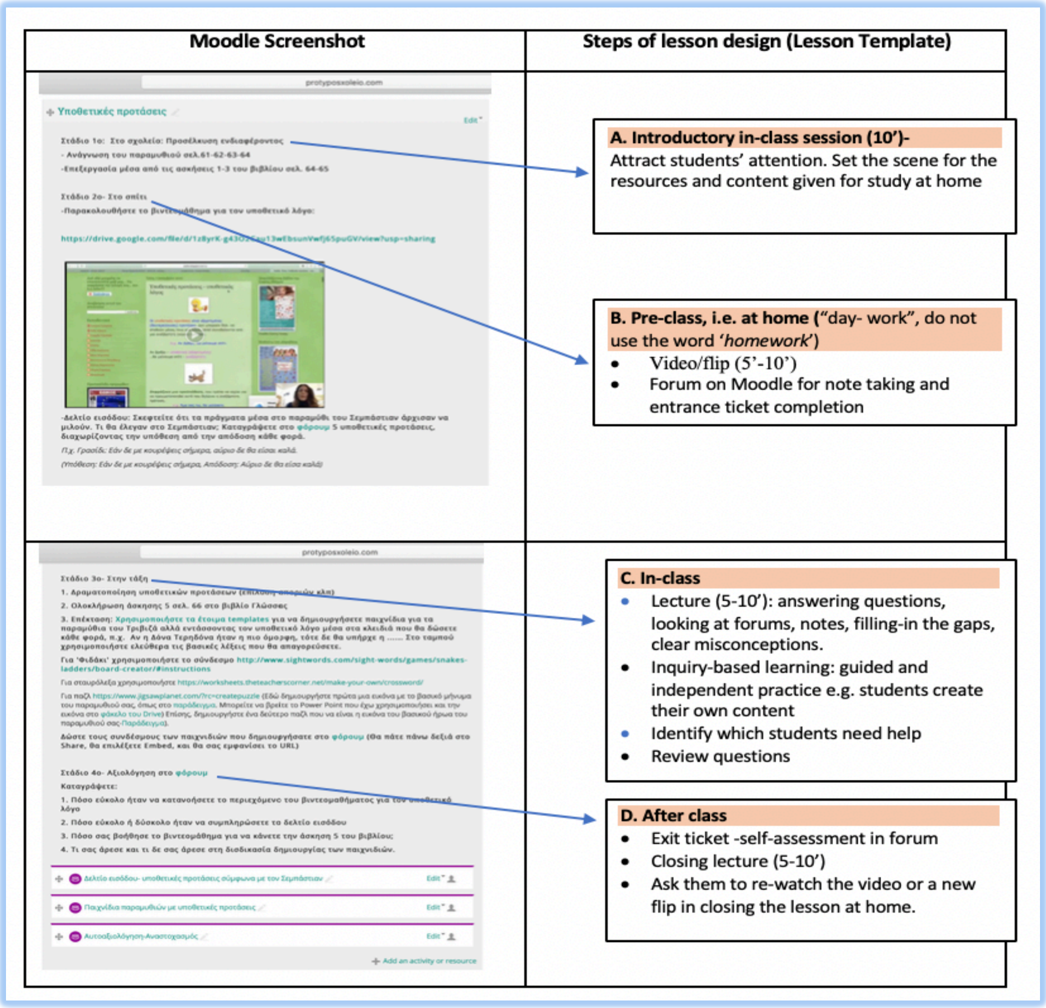


Figure 6.2. *Example of IB-FC lesson design (Revised)- Moodle Screenshots*

Structure is not only achieved by following an IB-FC lesson template. Orchestration routines have to be adopted. This means that educators should provide all the necessary instructions for the students to be able to find their way on their own and achieve higher orders of cognitive work (Lankford, 2013; Zainuddin & Halili, 2016). Instructors need support and guidance to successfully maintain orchestration in a FC (Berrett, 2012), hence an IB-FC Orchestration tool was initially developed (see Appendix 2). It seems though that educators' past experience in TEL implementation projects has been a vital factor in orchestrating ICT integration approaches such as IB-FC. Hence, *Elisabeth* (CS6- dropped case study) has not been able to implement the model effectively and dropped out from the research within the third month of implementation.

The IB-FC Orchestration tool has been revised (see Figure 6.3), based on teachers', students' and parents' experiences and perceptions, and the dropped case study (see Appendix 14 for a full list of orchestration routines). The tool can be used by educators for designing well-orchestrated and effective IB-FC instructions, following specific routines and avoiding student disengagement for enjoying the benefits of IB-FC combination. These routines are categorized within the tool into three main parameters: activities, technology and classroom accounts, linked with arrows which show a model sequence of teacher actions. Underneath them, other orchestration actions associated with activities and technological tools are included, e.g. *monitor activity timings, provide devices for all*, etc.. These are explained in detail within the practical guide, together with supporting quotes. For example, the use of safety filters has been valued very important to parents, both in this research and in another research in Cyprus which aimed in exploring parents' and children's awareness in internet threats (Ktoridou, Eteokleous, & Zachariadou, 2012). Many of them will be discussed within other UDPs but they are included here also as part of the structure teachers should consider during design.

Emphasis is placed on the participating teacher being either the form tutor or have a close communication and collaboration with the forum tutor in managing timings, devices and 'homework'.

The upload of content on the right VLE page or folders on the classroom's online drive is highly important, e.g. '*I will create a folder for mind-maps'* (*Mary*) and how students should proceed at any time. The monitor of activity timings (and even Moodle timings) is also vital for young students (e.g. use of timers). Moreover, young students (especially lower primary) should be given a chance to download necessary software and applications whilst working on other activities in-class to avoid extra effort and confusion at home. In orchestrating FC with young students, signals in class have been also highly useful.

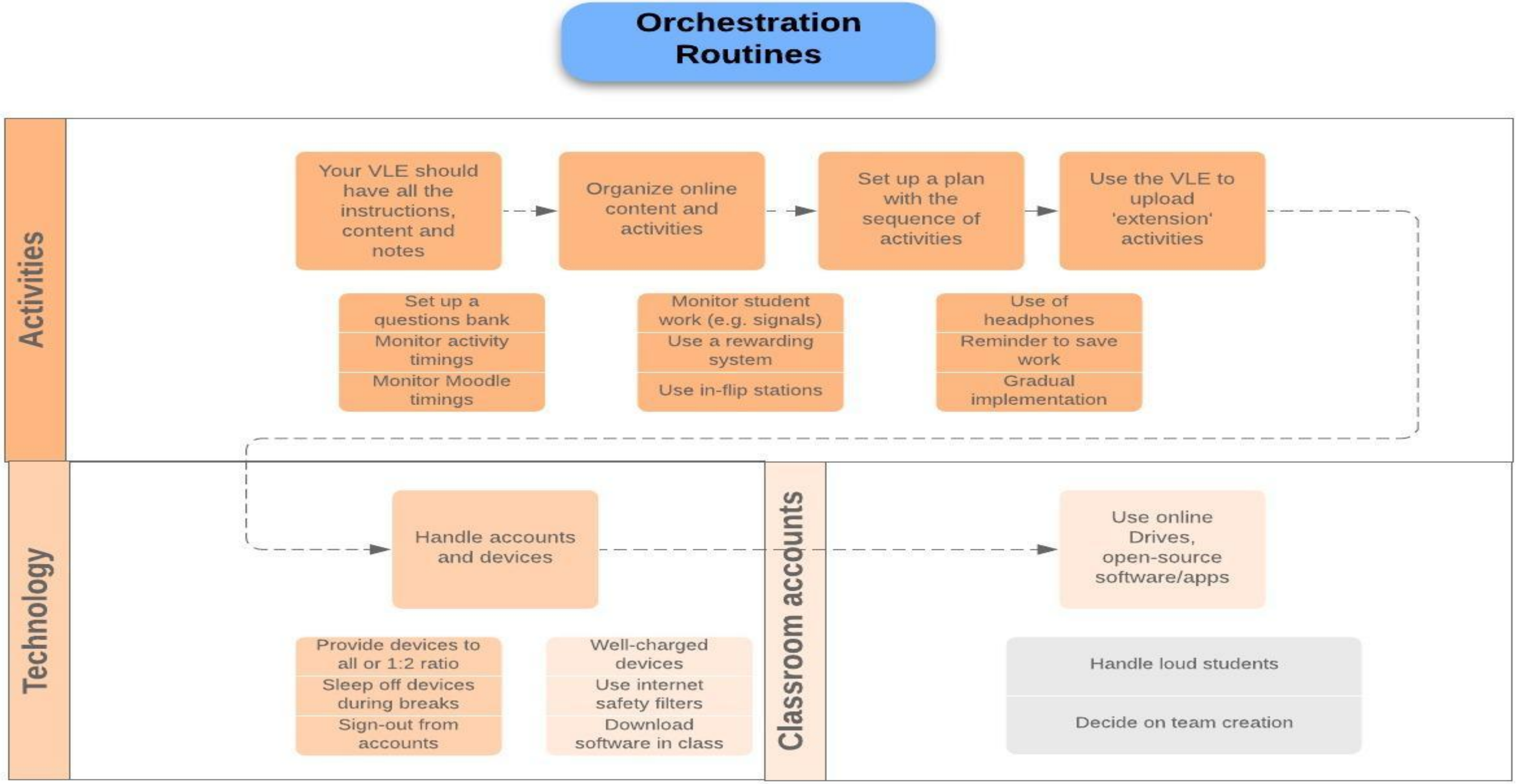


Figure 6.3. *Revised IB-FC Orchestration Routines Tool*

6.2.2 Flexibility.

The model should be used selectively during design and flexibly during implementation.

The model should be used selectively. Parents noted that the model should be used in a combination with traditional teaching (e.g. P2.8). If the model is universally implemented, it conveys that a primary school student who is taught five to seven different subjects during a school day will have the same number of different flips to watch at home and complete the corresponding entrance tickets. This is contradictory to the notion that students shouldn't be overwhelmed with pre-class material (Capaldi, 2015). It would also translate into a huge workload for the teacher in preparing all the flips, since primary school teachers teach almost all subjects to their classroom students and do not specialize in one (as opposed to secondary and higher education settings).

Specialized expertise, time and equipment costs for the creation of instructional material by the teachers are some of the challenges recognized in ICT integration initiatives (Hadjithoma & Eteokleous, 2007) and within FC literature in particular (e.g. Lage et al., 2000), and within all the participant teachers of the research. Hence, the blend of face-to-face activities with online learning should be done selectively and gradually (Heilesen, 2010; Poon, 2014).

Moreover, in-class activities which are not clear during implementation whether they assist young learners develop critical thinking skills effectively, should not be repeated in the design or should be substituted (O'Flaherty & Phillips, 2015;

Rahimi et al., 2015), i.e. '*There should be flexibility during implementation*' (*Ben*). Indeed, in cases when teachers felt flexible enough to instantly upload new content or launch a new activity, students were observed to work better and need less teacher guidance (CS2, CS4, CS5). Moreover, there were occasions when teachers had to be able to switch from one software/application to another or download a new one to avoid time waste and student confusion.

Flexibility could also be enhanced through in-flip methodology or stations. This means that the flips could be watched in class by using the board, on a particular device and place/station in class (by a group of students) or individually on the students' devices instead of watching them at home (see Figure 6.4).

Figure 6.4. *In-Flip station (CS1-15012018)/ In-Flip methodology (CS5-11112017)*

This has been proposed by teachers of lower primary students (*Tesa & Rosemary*), to avoid time waste with disengaged students and reduce parents' stress when their children get lazy at home. After all, an effective implementation of any FC model requires flexible learning experiences (e.g. Tawfik & Lilly, 2015) and in-flip could help the teacher observe exactly who is watching the flip. Also, the initial exposure to the video content may have a better chance to sink in. The disadvantage is that technically there is no 'gain' in classroom time and it is not very suitable for one-period lessons.

The new In-flip IB-FC tool (see Figure 6.5) developed points out the learning route the teachers should follow depending on whether the flip was given out on a compulsory basis. If yes, the unprepared students would follow a different route (watch the flip in a station, complete the entrance ticket, answer further review questions) and proceed to IBL activities if the content is understood. If the flip was not compulsory, then the whole class could watch the flip in class and depending on the level of understanding, students may proceed to IBL activities or pass through a personalized help session. What happens though is that teachers need enough stations to provide work for students who haven't watched the flips and some for those who have, unless there are enough devices for individual in-flip. If teachers plan bigger learning cycles, e.g. weekly goals, then stations could work more efficiently and reduce rotation time.

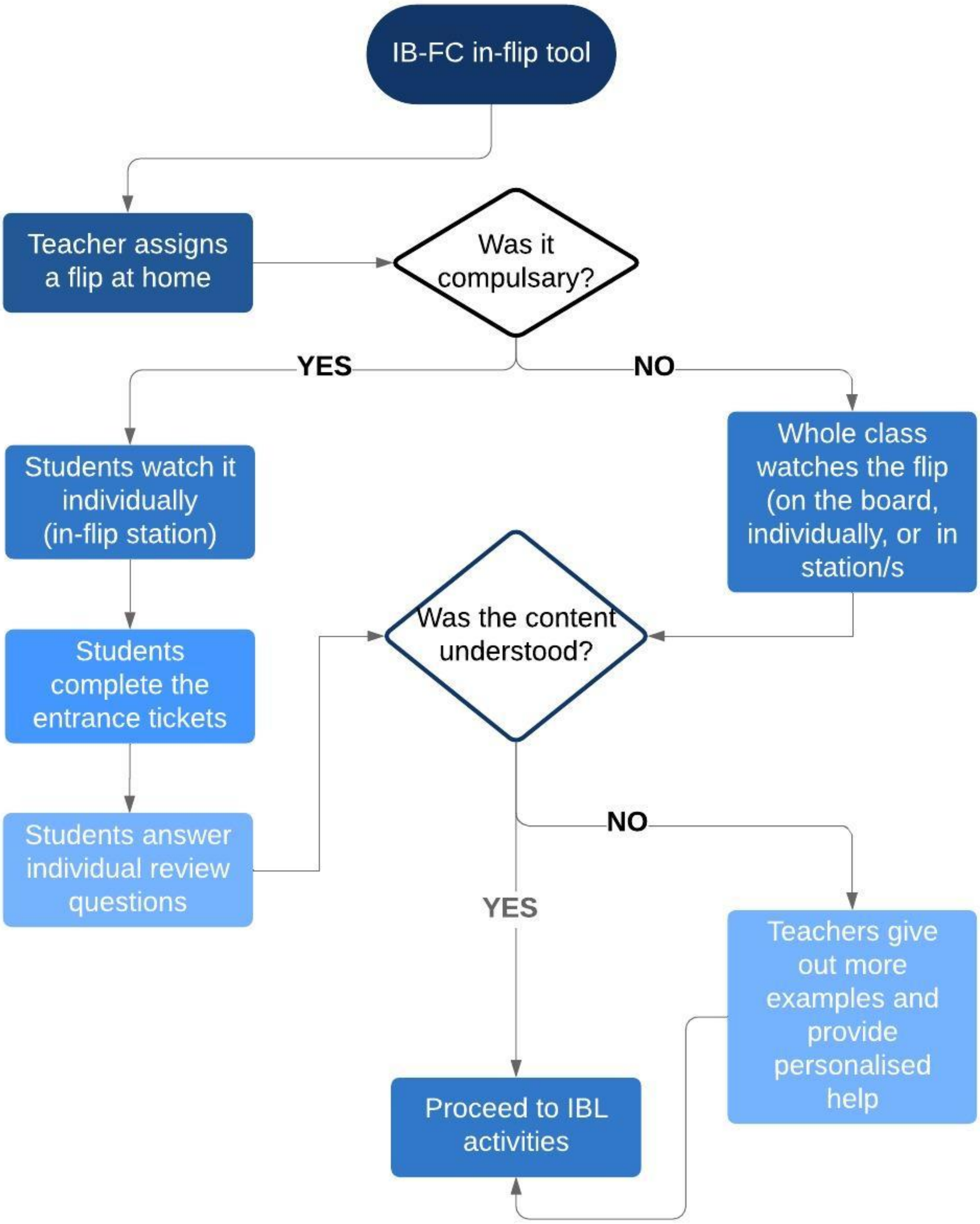


Figure 6.5. *IB-FC In-Flip Tool*

6.3 UDP2: Simplicity and Accessibility

Simple and universally accessible technologies should be used (internet connection, devices and software). Students should be able to use them and the teachers should feel confident to solve technical issues.

The first step towards deciding on the adoption of an IB-FC model implementation altogether, or on the lesson designs, is to have good internet connectivity, both in class and at home. In cases where there is good connectivity in class but no connectivity at home, then alternatives to access online content should be provided to students, e.g. give out content on a USB stick or text content in printed form, or use in-flip methodology, e.g.*'…Using their headphones*' (Rosemary's classroom). Indeed, access to networked and school technology by students is one of the challenges of the FC approach (Ullman, 2013). Young students are not in a position to find a solution on their own and should be supported in any way. Parents have also considered their role as vital in dealing with possible connectivity issues at home. Moreover, poor connectivity in class during the research led many students and sometimes teachers to frustration (e.g. *Elisabeth*'s drop-out).

The availability of devices, both in class and at home, is also a major issue in any FC methodology, especially for IB-FC, since most activities in class are computer-based. A complete 'IB-FC Device Management' tool has been developed (see Figure 6.6), considering availability of devices and teachers' choice on how they would like to work with their students in class.

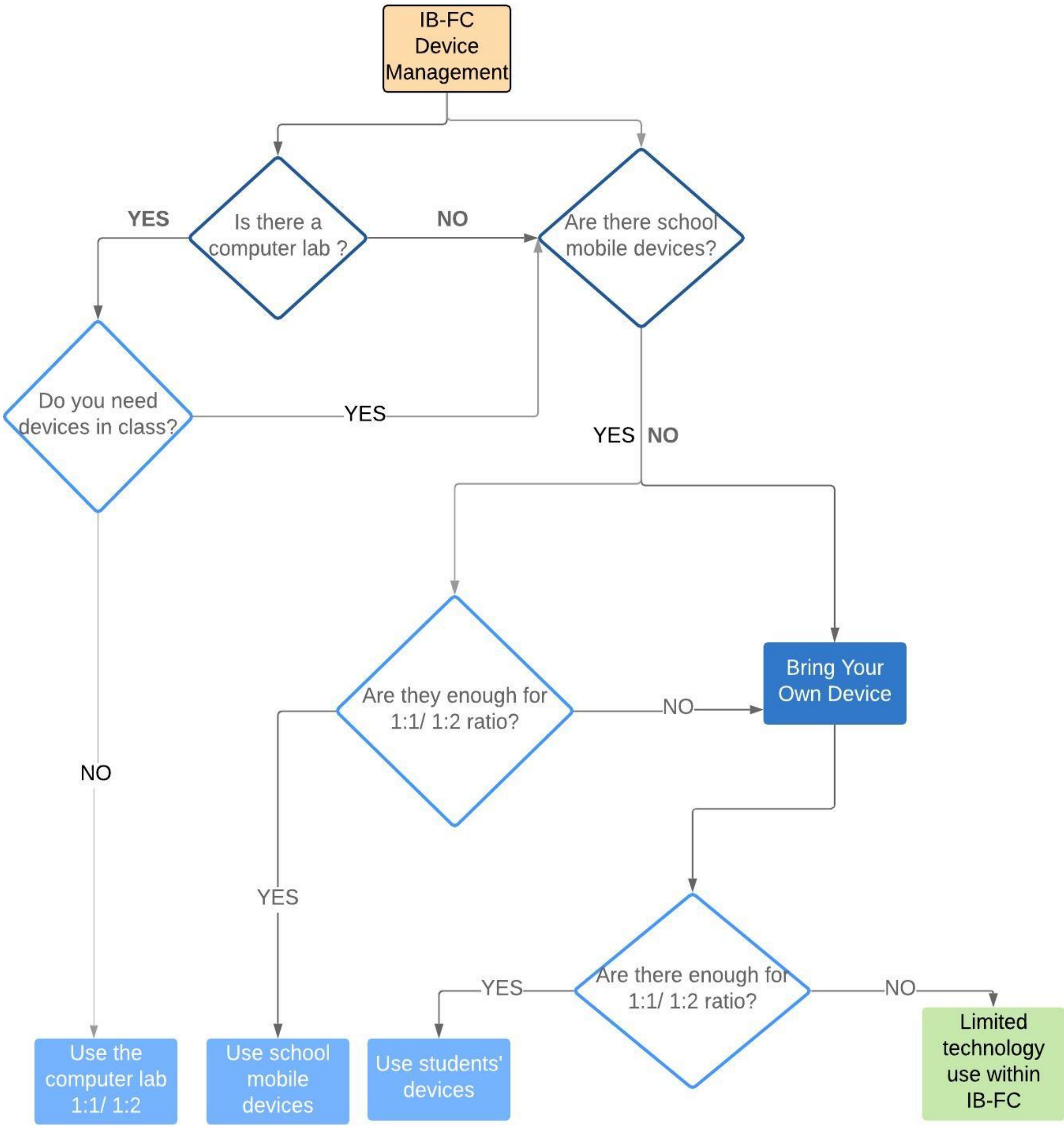


Figure 6.6. *IB-FC Device Management Tool*

During the research, teachers preferred using mobile devices in class and not the computer lab, since '*that provided flexibility*' (*James)*. Maintaining a 1:1 student-device ratio in class was easy but not always necessary. A 1:2 ratio works best with the young students whereas the adoption of a BYOD initiative seemed to solve many device problems for *Ben* and *Mary*. It is indeed an option when school mobile devices are not enough for a 1:1 or 1:2, or for increasing engagement of the lower primary students.

The third important step towards IB-FC implementation is the use of simple and universally accessible technologies so that students are able to use them and the teachers feel confident to solve technical issues aroused. The technological competence they should attain usually provides stress to the teachers (Millman, 2012; Townsend, 2012). Teachers with better ICT skills and greater experience in ICT integration (*Ben & Mary*) were able to better adapt to problems arising during lesson time, whereas others usually asked their students to work offline or in pairs, e.g. CS2- 27112017.

Widely accessible tools for the creation and sharing of flips has been used in FC research, e.g. Youtube, iTunes (Kotlik, 2014) together with digital video libraries e.g. Khan Academy (Hao, 2016). Indeed, findings indicated that most teachers preferred using or modifying ready-made flips (see Figure 5.1) as it was both easier and less time-consuming. The entrance tickets were mainly created using Moodle tools, especially Moodle forums (see Figure 5.7).

The built-up and use of a well-structured VLE, which can be used for the upload and sharing of content (flips, entrance/exit tickets, guide and links for IBL activities), facilitates effective implementation of FC methodology (e.g. Baker, 2000; Pempek et al., 2009; Talley & Scherer, 2013). It can also help young students deal with the investigation procedure of IBL activities (Magee & Flessner, 2014). Parents also asked for a more personalized access to their children's Moodle account to '…*keep track of the students' progress*' (P5.2), suggesting the creation of a Parents' page. Most importantly, teachers should choose a VLE which works on all devices and guide students through it (e.g. T-CS3-03112017).

Other digital technologies, suitable for the age of the students can support such innovative pedagogical designs (Lyons, 2008), e.g. the use of Google Docs and Google Hangouts, used in the research of Kim et al. (2014) and Kong (2014). IBL activities included the built-up of multimedia, online research, use of Drill and Practice apps and argumentative writing (see Figures 5.11, 5.12, 5.13). Teachers aimed to use simple and accessible technology, exploiting Moodle tools (especially forums for sharing questions, comments, feedback etc.) and other open-source software (e.g. preparing a Google slides presentation).

A list of digital tools used, recognized as simple and useful by students and teachers, has guided the creation of the IB-FC Technology tool (the initial IB-FC Digital tool is more detailed in terms of software and can be kept for reference-see Appendix 2). The tool (see Figure 6.7) is divided into examples of useful software for flips, entrance tickets, IBL activities, collaboration, communication and assessment, whereas a VLE or a Learning Suite is recognized as a general management tool of higher value, with embedded Students' and Parents' page.

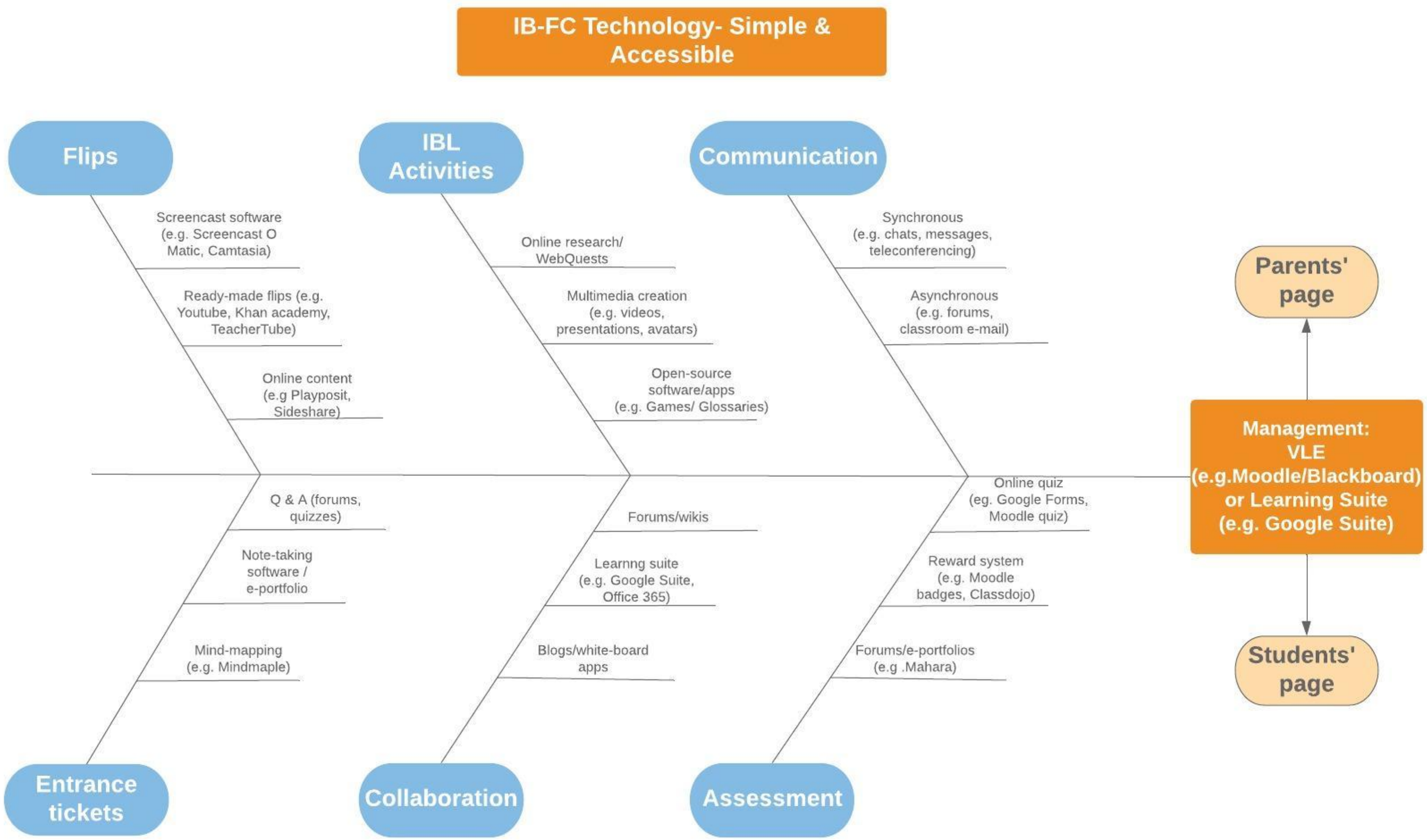


Figure 6.7. *IB-FC Technology tool: Simple & Accessible*

Overall, a clear illustration of the technology and guidelines on how it could be used both at home and in-class should be given from the beginning. During the preparation of the IB-FC learning designs, educators have to make sure that the flips (videos, presentations, online sources) can open on all devices as young students cannot solve compatibility issues on their own. Students have been overall very positive in relation to the technologies used. Their perceptions have been very important to consider within IB-FC implementation so they wouldn't feel helpless and discouraged (Mason et al., 2013), but satisfied and willing to work (Zhai et al., 2017).

6.4 UDP3: Interconnectivity and Community

6.4.1 Interconnectivity.

Connecting individual space and collective space: IBL activities which clearly connect the individual learning space with the group learning space should be chosen. Students should be able to make the connection.

Maintaining interconnection between learning spaces requires the students to first watch/study the flips, in any format they are given before coming back to class (Hamdan et al., 2013). Teachers need to make it clear to the students how important this is and that it is compulsory, not optional: e.g. '*You need to watch the material so we can proceed further in the lesson on the next day with other new activities*' (*Ben*). Maximum comprehension of the flip content is also required, if students are to achieve higher order learning (Yarbro et al., 2014).

Depending on the content and length of the video, students should watch it more than once and as many times as needed (Loizou-Raouna & Lee, 2018c). Indeed, the more times the students watched the flips, the better they could usually work in-class the next day and the higher they scored in their assignments/tests, verified by many previous studies (e.g. Bergmann & Sams, 2012; Young et al., 2011). The flips should also contain the right amount of new knowledge and have an added value, similarly emphasized by Kong and Song (2015). Overall, students proposed a simple note-taking strategy to deal with the new information. This is in line with what the IB-FC Flips tool propose and it is the starting point of the IB-FC In-class tool in Figure 6.8.

Participant teachers said that in time they themselves have learned how to find the right balance between the flip content and the IBL activities on the next day in class, practicing the lowest levels of cognitive domain away from the classroom and focusing on higher order cognitive work in the classroom (Krathwohl & Anderson, 2010). Furthermore, as Gaughan (2014) highlighted, the video lectures should be highly related with classroom time and trigger students' interest for the in-class activities which follow. Hence, ready-made flips must be customized to fit with the specific goals of the lesson and should be followed by entrance tickets, which would ensure the teacher to have a clear view of the students' knowledge prior to entering the classroom. E.g. Short questions could be integrated within a flip. Teachers realized that they should not ask the students to work on something meaningless and irrelevant but on something they could easily relate to after coming back to the class, thus also avoiding students' disappointment. Similarly, in the research of Talley and

Scherer (2013) and Kim et al. (2014), students felt confident in class to discuss and participate because of their preparation before coming to class. Moreover, in cases when feedback on the entrance ticket was offered to students before coming back to class, misconceptions and disengagement were kept to a minimum. Likewise, Sandberg et al. (2014) emphasized how student learning logs can be created and analyzed via cloud computing services and hence learning support can be more easily provided before the in-class activities. All in all, the creation of the right instructional material has always been one of the main challenges of FC research in any educational level (Lage et al. 2000; Yarbro et al., 2014).

In Figure 6.8, the IB-FC In-class tool visualizes the interconnection between the individual and the learning space, showing how students can progress from the lower cognitive skills to the higher order skills, given that teachers can ensure the right connection is made by using any of the proposed learning supports. After the appropriate flip and the equivalent entrance ticket is given, teachers should remind students about the content of the previous lesson and the flips watched at home so as to avoid a passive learning style in class (Bergmann & Sams, 2008). Classroom observations have revealed that the introductory part was mostly designed for this, e.g. '*One of you should remind us what we did in the previous lesson and what you have watched at home…you have it there in front of you, on Moodle*' (T-CS1-12122017).

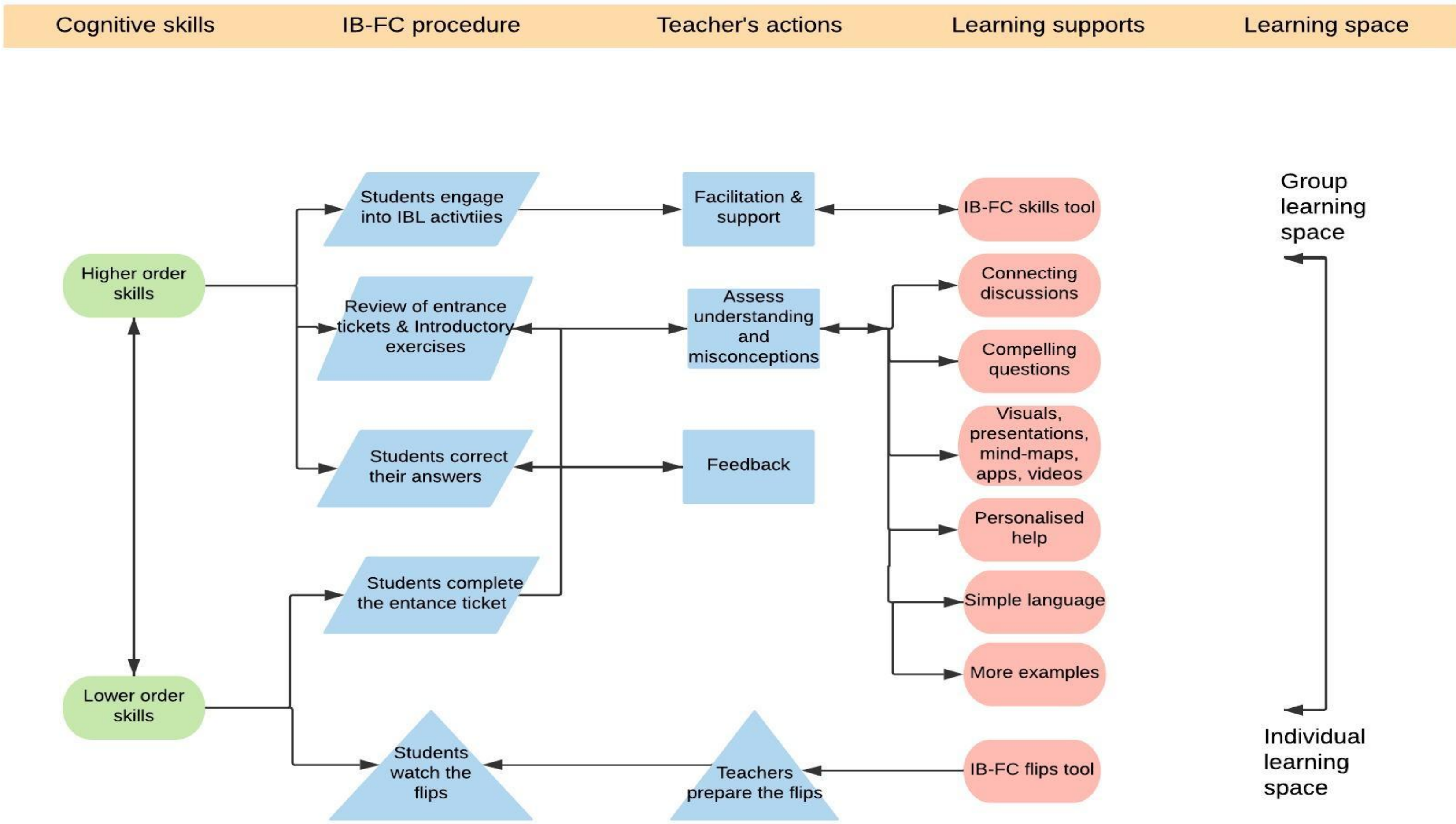


Figure 6.8. *Revised IB-FC In-Class Tool*

Teachers have mostly used review questions and moved on to asking questions about the content of the flip, sometimes playing the video-tutorial again, e.g. '*The teacher says that she will play the video flip again in case the students have forgotten the content*' (CS1-29032018). Within the FC literature, students felt helpless and discouraged if they did not comprehend the flip content (Hwang & Lai, 2017; Kim et al., 2014; Mason et al., 2013). Students in the current research felt alike. In order to avoid this, review questions were usually followed by examining the entrance tickets, e.g. '*Let's have a look at what you have noted down…I am so glad that you have spotted all of that in the video since today we will take it a step further*' (T-CS5-16112017). A revision was sometimes achieved through online quizzes at the beginning of the lesson, e.g. on Kahoot: '*We will have this kind of tests regularly because we need to build on this content*' (T-CS3-01122017).

Therefore, assessing the level of understanding of flip content before proceeding to the IBL activities is vital in primary education, much more than in any other level of education previous research has focused on (e.g. Al-Zahrani, 2015), as displayed by the IB-FC In-class tool. Introductory exercises could also be assigned illustrated in the flip (e.g. CS1-29032018) or an additional introductory video: '*I searched online if there were any videos that I could use as an introduction to my class, beyond the flip, just to trigger further the investigation in class'* (*Tesa)*. At times, students also happened to introduce the lesson themselves (CS5-13032018). The point was to clarify and revise. Discussions (CS1, CS3, CS4, CS5), mind-mapping (upper primary:CS4, CS5), presentations (CS3, CS4), visuals (CS3, CS5), smart whiteboard apps (CS5) and other videos (CS1, CS3, CS4) were some additional actions/learning supports taken by participant teachers in clarifying issues and concepts introduced within the flips before proceeding further. Moodle was also used for uploading revision material and more examples. Numerous research between 2013-2018 on FC (e.g. Chen et al., 2014; Davies et el., 2013; Roach, 2014; Simpson & Richards, 2015) have used project-based learning for enhancing FC methodology but have not clarified such specific actions during the introductory part of the lesson in the group learning space.

Interconnection is not only about revising. It should emphasize using simple language and visuals to connect to the new knowledge. This has been particularly important for the lower primary students, whereas more meaningful 'connecting discussions' were observed with upper-primary students who usually had to make the connection through further online research, e.g. '*You will use three links…You will not be able to understand all of the words but I want you to get the overall meaning'* (T-CS1-05122018). Asking compelling questions to make sure the students are ready to apply the new knowledge has proved effective as students actively participated in the learning process. E.g. Teachers asked compelling questions about the process of letter writing (CS1), to prompt students to add as much detail as possible to their narration (CS5) or extend their answers and include greater detail to their work (CS3). Lastly, a good practice is to address misconceptions as soon as they arise. For example, teachers have stopped a learning game to revise concepts (CS3), given out more directions/examples on the board (CS5), gone over and over a solution process (CS4) or offered personalized help (CS1). E.g. '*Let's go to question 5.*

I want to make something clear because I have seen you working and some important things came out' (T-CS4-26012018).

Overall, Figure 5.21 in the findings illustrates teachers' views on students' benefits from IB-FC implementation and it is the best evidence on how interconnection is achieved within the model. Depending on all of the above, the IB-FC In-class tool has been revised as presented above, with an emphasis on the leaning supports for achieving interconnection between the two learning spaces.

6.4.2 Community.

The building of a young learners' community should be developed through multiple-means of communication between clearly defined and well-structured guidance and support.

IB-FC implementation in primary education needs the building block of a young learners' community. This encompasses parents' close collaboration with the teacher. However, no past FC study has addressed the matter of parents, given also the fact that FC research has focused primarily on higher levels of education. Data collected on parents' experiences and perceptions within the current research, has indicated that they need to be well informed about the methodology and the tools used. Parents usually appreciate a close cooperation with the teacher so they can support their young children in the best possible way. Hence, teachers could organize parents' meetings prior to implementation (done in this research), talk about the qualities of the methodology and familiarize parents more with the VLE and other orchestration tools of the learning process: *'It would have been nice if I got informed myself as well about what the children are doing on the platform'* (P3.2). Teachers can also illustrate the right way to guide their children towards watching/studying the flips and taking notes.

Discussing with parents which means of afternoon communication would be offered to themselves and their children by the teacher is also important, investigating first the ICT competency level of the parents. Extra support should be given to students whose parents are not ICT competent. Findings indicated how parents' perceptions affect their children's willingness to work. Further details on the actions to be taken for enhancing parent and teacher cooperation are included in the IB-FC practical guide (http://flippedclassroomcyprus.blogspot.com). In an attempt to relate parents' role with previous research, quantitative data analysis by Lau and Yuen (2014) showed that one of the factors which influence students' flipped readiness was '*the availability of outside school support'* (p.295). Allowing for this, an IB-FC Community tool has been developed (see Figure 6.9), which recognizes the overall interaction between parents-students and parents-teachers, through support and co-operation. Thus, no starting point is recognized within the tool.

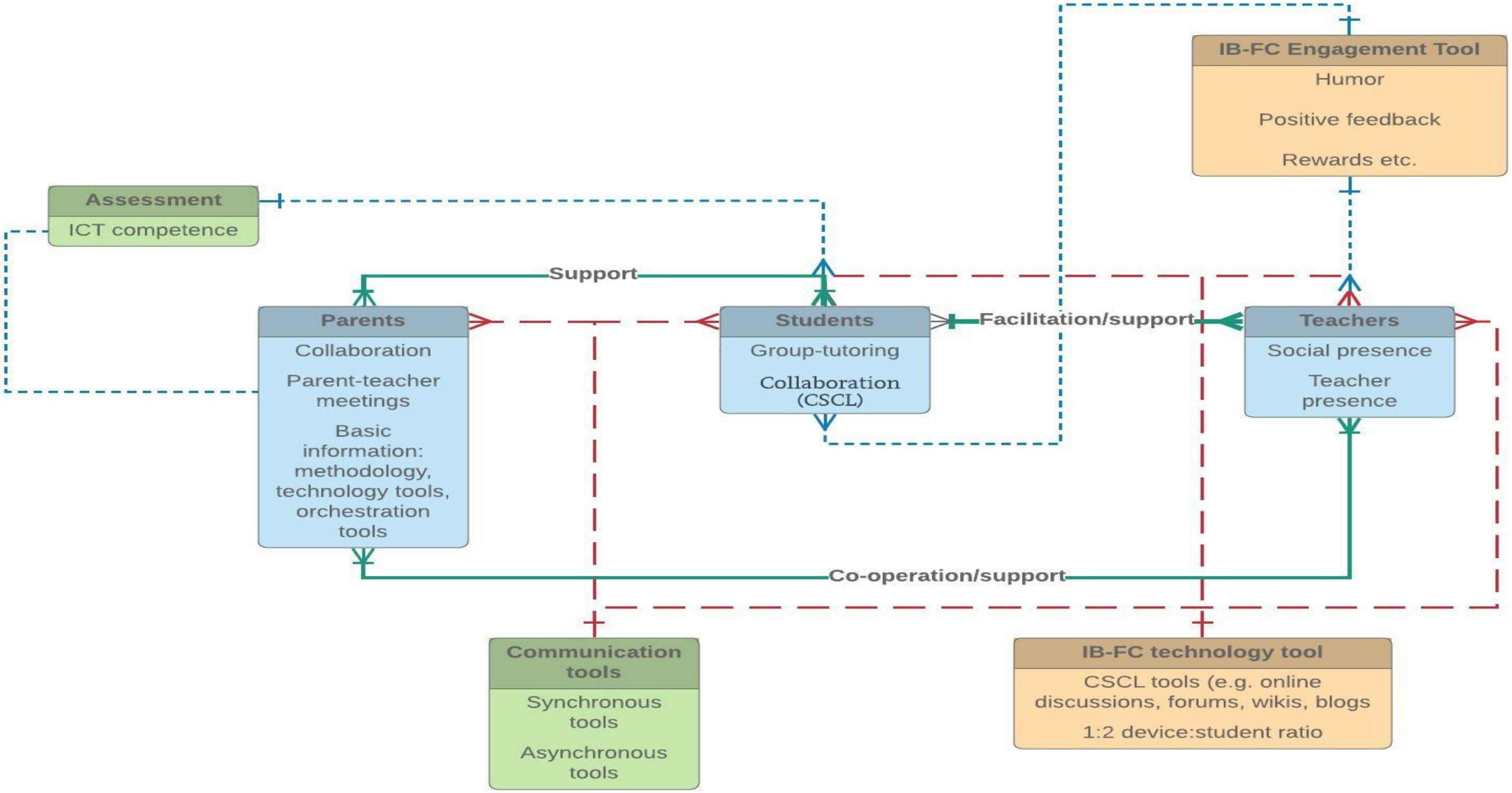


Figure 6.9. *IB-FC Community Tool*

The assessment of parents' and students' ICT competency influences the interaction and support given. Parents and students should also be able to personally contact the teacher in a synchronous or asynchronous way (communication tools) at any time during the learning process, especially during their work at home, e.g.: *'For me…I want a way to conduct our teacher so she can explain to us more*' (S1.4). Teachers should therefore allow multiple means of communication, after a close discussion with the parents. Almost all students (n=71 out of 77) reported that they get some kind of support required from their teacher whilst completing the entrance ticket. In-class student-teacher interaction usually increased through FC implementation for IBL activities (Gough et al., 2017). This was clear in the upper primary classes of the study (CS3, CS4, CS5), but not so clear in the lower primary (CS1 and CS2) given the number of disengaged students.

Teachers should circulate around the classroom and support students, providing facilitation for building a learning community, illustrated by a double interacting arrow within the tool. This clearly referred to Kim's et al. (2014) *social presence* principle. *Teacher presence* and facilitation has been of major importance in many FC studies, (e.g. Kim, 2017; Lage et al., 2000). *Teacher as facilitator* was one of the major themes in Tawfik and Lilly (2015) research which focused only on student interviews. The current study adds students' experiences and perceptions through classroom observations as well. Observations witnessed participant teachers offering further advice and examples to students on how to complete IBL activities and making sure e.g. '*students are on task'* (CS3-2322018), '*explained to them what they had to do* *about the assignment*' (CS2-16112017), '*offered personalized assistance*' (CS5-20032018), and '*gave feedback and corrected everything they had already finished*' (CS5- 26022018). Extra support for the use of software was also given at any time during the lesson, e.g. on how to upload (CS1, CS2, CS4, CS5), how to start a quiz (CS4), how to use a Moodle wiki (CS5) etc.:

> '*I will give you an advice. Do not write directly within a wiki. Write everything in a word processor and then copy and paste it. This is to make sure you do not lose your work if the session expires before you save it.*' (T-CS5-20032018)

Competent ICT students can also volunteer themselves to give a hand to their peers and help out, e.g. '*One of the girls explains to the other student what 'refresh' is.*' (CS1-25012018)

Maintaining an open and friendly environment was a big part of developing a 'successful' learners' community and increasing motivation suggested by many studies (Housand & Housand, 2012; Jacobs, 2013; Koutropoulos, 2011). Observation notes witnessed how all teachers tried to make students feel comfortable in class by sharing their jokes, their work on Moodle and presenting to the whole class, playing music whilst the students work, giving out positive feedback to students as they work and reward students at the end of the lesson, e.g. '*If you have finished everything, log into Moodle and play in pairs a basketball multiplication game…*' (T-CS3-23032018). This means that there is a clear connection with the IB-FC Engagement tool, connecting the students with their teachers within the tool (see Figure 6.9).

Young students work best when they learn how to share and collaborate as this can minimize stress and enhance their creativity. Computer Supported Collaborative Learning (CSCL) tools, such as blogs, forums and wikis can vastly be exploited within such a model to promote group work and collaborative learning outside and inside the classroom (Eteokleous, Ktoridou, & Orphanou, 2014; McLaughlin et al., 2013; Zainuddin & Halili, 2016; Roach, 2014). Indeed, students preferred working in groups rather than on their own (as evidenced in the interviews) in order to combine each other's personal input from the flip, as long as everyone contributed. It also gave a chance '*to support each other'* (S4.3) and it has assisted them to learn better through explaining and helping each other (CS4-26012018). Many parents strongly believed that the model '*teaches children to work as a team'* (P1.1). This leads to the promotion of a dynamic and interactive environment as social interactions grow through such technology integration models (IB-FC) and are in line with Moore's technology-based learning, as explained by Wang (2013). Hence, there is a clear connection between the IB-FC Community and the IB-FC Technology tool, which influences student-student interaction as well as teacher and social presence.

In particular, the tool proposes a ratio of 1:2 (student/device ratio) for enhancing collaboration. In particular, many times students worked in pairs, using two separate devices, e.g. '*You can have the video on a different laptop and the wiki on another so you can watch and write your narration'* (T-CS5-21122017). Collaborative F2F or online discussions (e.g. through Moodle chats) were also encouraged, sometimes using flipcharts, whereas *Mary* often used small group-tutoring where students acted as teachers within their teams, using the flips and promoting the transition into the IBL activities. Important to note that the teacher should make sure that all team members contribute. Positive student perceptions have been recorded when there was real interaction and help from peers. This proves the findings of researches on student perceptions in secondary and higher education (e.g. Love et al. 2014; McTigue, 2009) are transferable to K-12 learners. Therefore, it is of no question that students did not like to work with disengaged peers who came to class unprepared (E.g. S4.12).

6.5 UDP4: Differentiation and Personalization

An opportunity should be given for all students to gain basic understanding and exposure to content prior to class. Flips should be short, simple and engaging, in varying formats to cater for different learning types and abilities. IBL activities should promote differentiation and personalization.

Differentiation and personalization within a FC methodology does not happen only with differentiated flips. The very nature of the FC approach provides flips at the individual learning space so that students can watch them as many times as they need to understand the content, promoting differentiated instruction and personalized high-order in-class learning (Yarbro et al., 2014). Students have recognized that they do not all share the same skills, abilities or prior knowledge, e.g. '…*we are all different*' (S4.1); '*I kept playing it [the video] all the* *time, and if I wouldn't understand something I would press 'pause', rewind and watch it again…*' (S1.7). Most of the students claimed watching the video twice so as to be able to complete the entrance ticket, whereas some students felt a bit disappointed if they had to review the video far too many times in order to understand and remember its content, e.g. '*Perhaps others may say it's easy but for me it was a bit difficult*' (S3.5). Hence, to avoid students' disengagement and disappointment, teachers should simplify the content or the text (used as an explanation on ready-made flips). Participant teachers would sometimes simplify the text. Differentiation came when teachers gave out flips in multiple formats and a chance for students to choose which flip to consider and work on. Thus, content should be given in alternative ways, '*other than just standing in front of them*' (*Mary*). For example, flips were given in the form of videos, presentations, online resources in text or other multimedia form, printed text, applications, etc.

The aim is to cater for different learning types and attract students' interest through the use of multimedia, similarly supported in the research of Leutner (2014). Indeed, some students (n=23 out of 77) emphasized that they prefer a combination of video and text within the same flip or like having a choice in the afternoon. In a few instances, participant teachers have tried to give out a choice. '*It hadn't been though always easy to offer alternatives'* (*Tesa*). '*They would usually give a video on a compulsory basis and have the rest of the resourcing as optional*' (*Mary*). *James* had many foreign students in his class and believed that a right collection of the flips has helped them overcome many language problems. Parents also appreciated how the flips have helped them offer extra personalized guidance to their children on, e.g. '*I liked it because I could also watch the lesson and help my child in the right way'* (P5.10). Even more, teachers believed that '*better results towards personalized learning and differentiation*' would be easier to achieve with a close collaboration between teachers and parents.

The same strategy should be followed for the entrance tickets. Teachers should give students a choice and not give out the same activity to everyone, i.e. they should differentiate. '…*Somehow I feel it [differentiation] is made more possible with this methodology*' (*Rosemary*). Studies have shown how differentiation which is promoted through FC can help avoid students' boredom or students' and parents' frustration at home (E.g. Gaughan, 2014). However, participant teachers have not always offered a choice on the entrance ticket to be completed. Sometimes students complained that they '…*were writing answers and a lot of things*' (S1.5), even though teachers mostly claimed that they respect the young age of the students.

The length and type of the videos or flips in other formats is also critical. Participant teachers acknowledged the value of short and attractive flips, elaborated in many FC studies such as Enfield's (2013) and Ash's (2012). Participant students felt dissatisfied with long videos. Entrance tickets should also be short activities, '*no more than 20 minutes*' (*Tesa*), to avoid student disengagement given than students never liked long complicated assignments and their parents '*did not always have the time to help'* (P4.7). In particular, if we consider the research of Hung et al. (2010) and Lau and Yuen (2014), students' flipped learning readiness and individual differences should be reflected in an effective learning IB-FC learning design.

Personal contact with the teacher for guidance during afternoon work is essential and immediate feedback offered to students after the completion of the entrance ticket should be personalized. In-class IBL activities should also cater the differing levels of the students, especially for low achievers with limited pre-knowledge base (Kim & Chin, 2011). For example, in this study, *Tesa* has used WebQuests as guided research in contrast to free online research. *James'* and *Mary's* students reported how easy everything was as they have teacher's support in class as well, due to savings in classroom time. Learning support/ feedback provision by the teacher at any point throughout the whole learning process, was one of the key benefits of the FC approach (Hwang et al., 2015; Sandberg et al., 2014).

This benefit was elevated through the IB-FC model as support towards the development of higher order skills was offered (Lankford, 2013; Nederveld & Berge, 2015; O'Flaherty & Phillips, 2015). This helps to overcome deficiencies in learning (Kim et al., 2014) or the lack of self-discipline of students engaging in IBL activities (Flick & Lederman, 2004). This was not maintained in the current study whenever students came-in unprepared, e.g. in CS2 and CS3. This means that students' engagement is related to the level of differentiated and personalized learning, achieved through the model, as past research has shown: empowerment through differentiation improves self-motivation (Wormeli, 2006), especially through the use of technology (Barak & Asad, 2012). Winter (2018) in particular, has linked increased motivation with differentiated learning through FC methodology. Overall, teachers had most of the time the chance to work closer with the students who needed further guidance and assistance with the new and more complicated concepts. Students (n=49 out of 77) emphasized how helpful it was to work in this way. Students' parents also seemed convinced by the many advantages of the IB-FC model even for the young age of their children, as one parent noted, '…*it suits more my child's way of learning'* (P5.2).

All in all, the current research correspondingly agrees with similar qualitative studies in higher education (e.g. Lage et al., 2000; Marks, 2015) which provided options to instructors on how to cater for most learning types through FC methodology, while maintaining control over course coverage and content. The IB-FC Pre-class tool is hence revised in the light of the '*differentiation and personalization principle'*, called the IB-FC Differentiation tool (see Figure 6.10). This includes all three main components of the IB-FC model: flips, entrance tickets and IBL activities. The tool contains the basic differentiation and personalization features and illustrates that these can be applied and interconnected with all three main components of IB-FC. It has been evident from the UDP4 analysis that four main IB-FC tools (IB-FC Assessment, Engagement, Technology and In-flip tools) are connected to the IB-FC components and interconnected between them, which in turn are related to the differentiation and personalization features: *Short, simple and engaging; Combination of compulsory and optional resources/activities; Multiple formats: cater for differing learning types; Anytime feedback and personal contact.*

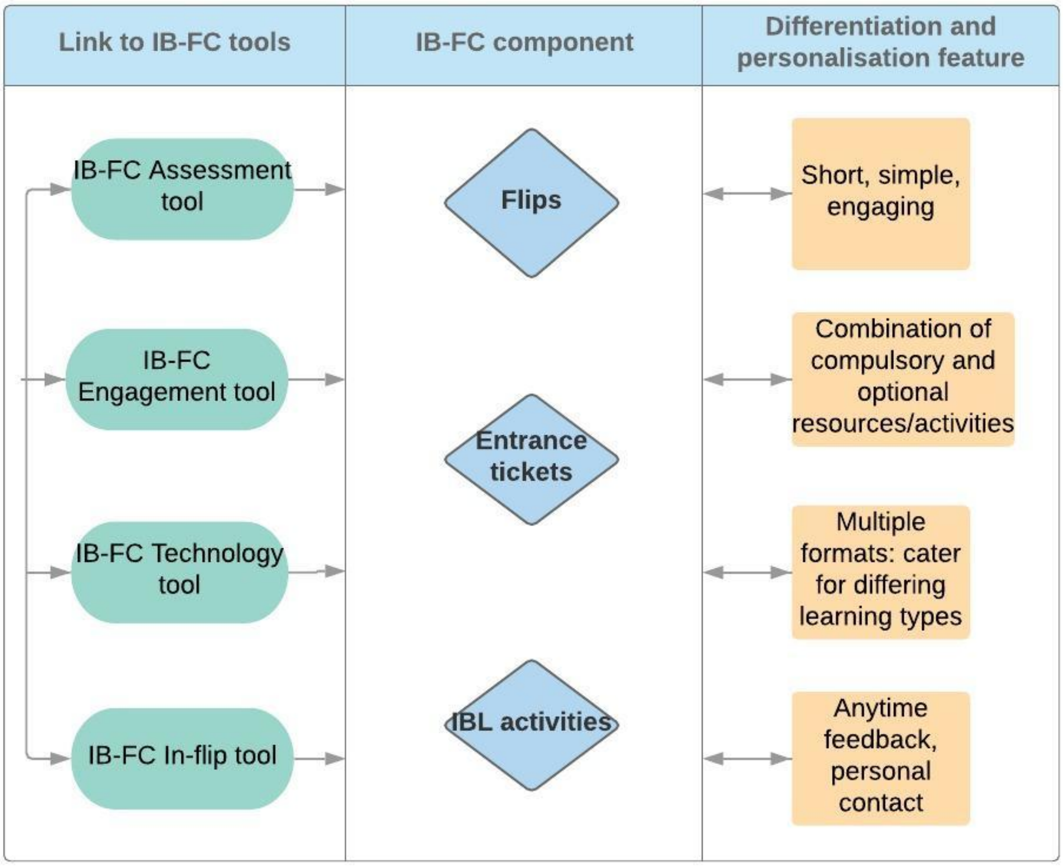


Figure 6.10. *IB-FC Differentiation Tool*

6.6 UDP5: Development and Progression

Activities which gradually promote IBL and transversal skills should be offered.

Teachers should spend time to help lower primary students who gradually attain IBL skills. 'Learning how to learn' is a difficult task for young students to master (Flick & Lederman, 2004). Since many planned IBL activities did not work best in *Tesa's* and *Rosemary's* classrooms, it is important that teachers spend time during the first months of implementation into building IBL skills, assigning easier and simpler tasks and guiding the students through them (Kim & Chin, 2011). For the upper primary students, it had been easier to promote IBL skills and teachers have worked with their students on different IBL activities. The true combination of IBL and FC methodology often offered the extra time needed for teachers to deal with incorrect outcomes and other problems during IBL. Magee and Flessner (2012) elaborated on this possibility, whereas many other studies combined the two teaching methods in higher education settings (e.g. Chen & Chang. 2017; Huang & Lin, 2017; Love et al., 2015). The results of such studies mostly agreed with the findings in this current research in relation to the benefits for the students, as mentioned during teacher interviews. These have been summarised in Figure 5.21.

Specifically, the most successful activities observed in class, were the ones which promoted the skills the initial research framework aimed at. Figures 5.11, 5.12 and 5.13 illustrate the type of IBL activities used in the different subjects of IB-FC implementation, mainly exploiting Moodle tools. The creation of discussion areas, the promotion of online research and the use of multimedia have been some of the IBL activities pursued within the group-learning space. Examples of how teachers worked with students for each skill are included in the IB-FC practical guide (http://flippedclassroomcyprus.blogspot.com) and lesson plan analysis (see Appendix 2 & Appendix 8). They are briefly explained with examples from the findings of the research, whereas the IB-FC skills tool (see Figure 6.11) has been developed in line with these, illustrating the interconnection between each IBL skill (2.1-2.7) and the transversal skills (3.1-3.7). The coding used connects the tool with in-class parameters 2 and 3 of the initial IB-FC framework (see Figure 2.6).

Gathering, critiquing, analysing, interpreting information (2.1): Online research for upper primary students (CS3-CS5) and WebQuests for lower primary (CS1, CS2) had been teachers' suggestions to promote critical thinking.

Concept application and creativity (2.2): Following an online research and the establishment of new knowledge, students can get creative through concept application, e.g. '*Students write-up their own Maths problems*' (T-CS5-14032018).

Creating working theories (2.3): Students can use their own mind-maps or others for parameter analysis (e.g. CS5- 21112017).

Posting new questions (2.4): Teachers can ask students to use forums or online chats for posting new inquiries or comments as these arise from their online research (e.g. CS5-13122017).

Hands-on problem-solving projects (2.5): Teachers should give activities which help students relate the lesson content to their everyday life (E.g. CS3-01122017; CS3-02022018) and '*keep them intereste*d' (CS1- 01022018).

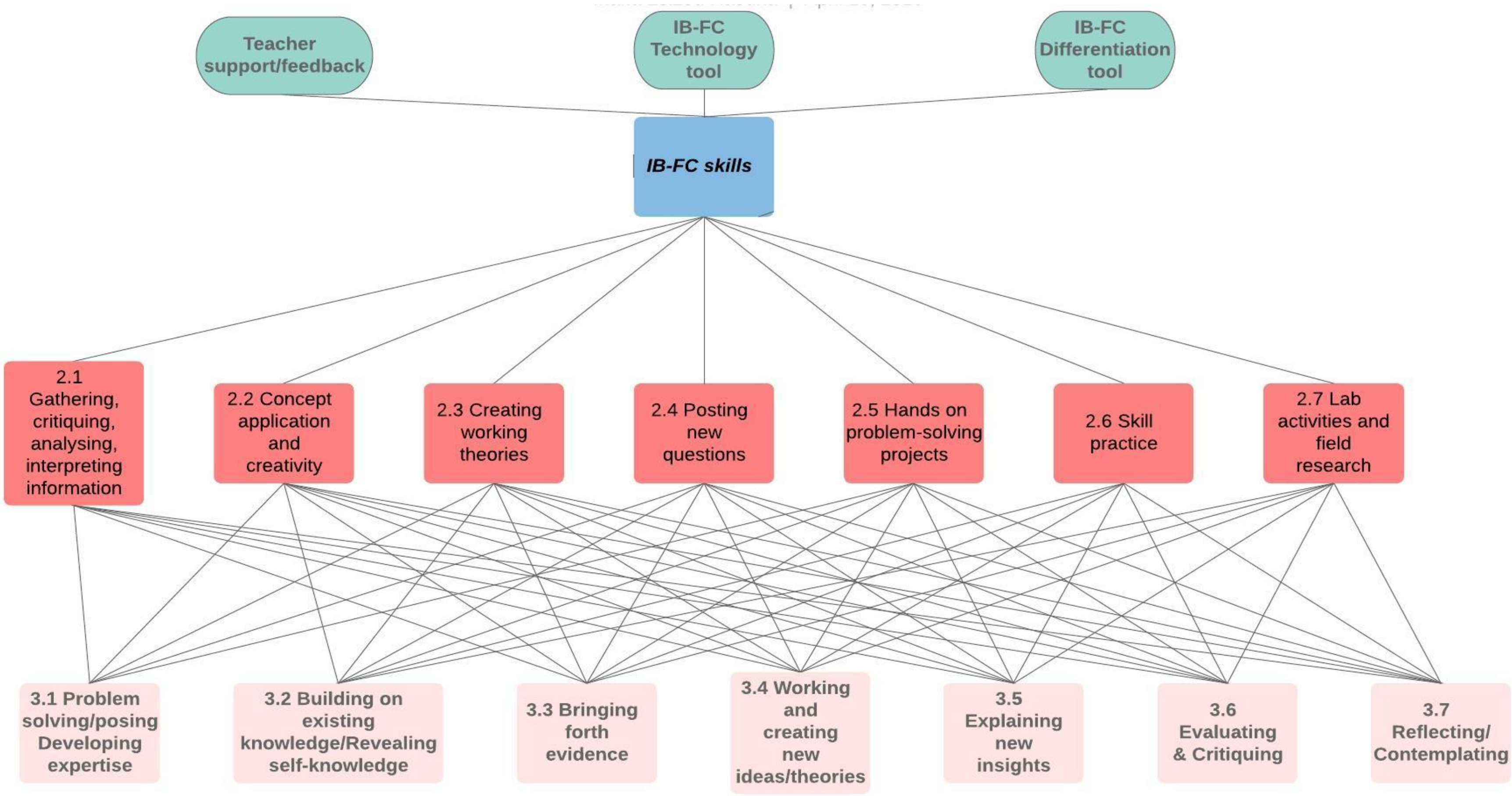


Figure 6.11. *IB-FC Skills tool*

Skill practice (2.6): Teachers can promote skill practice through many Moodle tools, online applications/software and websites or students can use their activity books or printed worksheets. Students said that they love playing 'Drill and Practice' games. Their excitement was clearly reported in investigation notes as well (E.g. CS3-01122017).

Lab activities and field research (hands-on or virtually) (2.7): Teachers should make use of lab activities, hands-on or virtual reality field research, e.g. Use of Google Expeditions (*Tesa* and *Mary*) to *travel* to different countries worldwide, leveraging students' excitement.

Besides the development of IBL skills through the engagement of students in all of the above clusters of inquiry, the development of transversal skills, as presented within the IB-FC framework, can be also maintained. These include:

Problem solving/posing- Developing expertise (3.1): Teachers should encourage students to answer their own inquiries, work and practice on the new content by describing the strategies they are using (e.g. CS5-08022018; CS1-07032018).

Building on existing knowledge /Revealing self-knowledge (3.2): Students can be creative by combining the new knowledge with the existing knowledge (E.g. '*Each group will have a different country to study. You will prepare a presentation*' (T-CS5) or revealing self-knowledge (E.g. create their own video-tutorials).

Bringing forth evidence (3.3): Teachers should encourage students to back-up their work with evidence, e.g. '*In order to answer the 'why' we need first to answer the 'how' question'* (T-CS3-19012018).

Working and creating new ideas/theories (3.4): One way to accomplish this is by asking students to create their own games (*Mary's* classroom) or execute 'concept missions' (*James'* classroom).

Explaining new insights (3.5): The ability to illustrate and explain one's own insight on a phenomenon is a challenge. Teachers have attempted with their students using narration standards, e.g. '*Use your own words'* (T-CS1-25012018). The ability to apply it on new research is also challenging,

Evaluating and critiquing (3.6): Students should be given a chance to develop the ability to self-evaluate, having in mind the marking/assessment criteria (e.g. CS3-10112017).

Reflecting/Contemplating (3.7): Students can reflect on their work through self-assessment or formative/repetitive assessment. For example: '*Now we will do the Kahoot quiz again'* (T-CS1-18012018). Students were also asked to create their own activities based on the content taught in the flip (e.g. CS3- 19012018). Further discussion on evaluation and reflection follows within *UDP7.*

Assessment and Evaluation. Teamwork, *teacher support and feedback* are essential for a successful IB-FC environment and the development of IBL skills (included in the tools), as these have been explained in the corresponding UDPs. Notably, no matter what the nature and the aim of the IBL activities designed, teachers should make students feel that *these are worth their time and attention*. This is one of the three principles Mazur et al. (2015) have used (in Principles of the Teaching Effectiveness Framework of Friesen, 2009) in their action research approach to indicate the necessity for further research in the field of FC in K-12 education.

Beyond the development of IBL skills, ICT skills are essential within such a blended-learning methodology and they are not always there (Wang et al., 2014). Again, alongside differentiation, this is associated with the OLRS and the ICT literacy scale suggested by Hung et al. (2010) and Lau and Yuen (2014) respectively. For instance, *Tesa, Rosemary, James* and *Ben* had to face the challenge to develop both the IBL and the ICT skills of their students, through personalized support. This set limitations to the kind of tools teachers can use and the pace of integrating IBL activities in class, hence the link to the IB-FC Technology tool and the IB-FC Differentiation tool within the diagram (see Figure 6.11). Parents benefited as well by developing their own ICT skills.

6.7 UDP6: Motivation and Engagement

Motivation and an incentive to students to prepare for class should be given (giving reasonable amount of time, opportunities for revision and extension IBL activities), exploiting technology in an engaging way.

One of the key principles of IB-FC implementation is how teachers offer motivation and an incentive to students to prepare for class in order to avoid disengagement and in-class revision problems (Cole et al., 2004). This has been one of the four design principles suggested by Brame (n.d.). Participant teachers dealt with disengaged students by creating in-flip stations, playing video-tutorial in class and explaining content, either on a personal or whole-class level.

Several studies have tested how the ability to learn independently at their own pace affects students' motivation and self-paced learning (e.g. Davies et al., 2013; McLaughlin et al., 2013). To achieve this, one of the steps is by what means teachers could guide the students how they should watch the flips at home, i.e. how to take notes, how they can pause and rewind and how they should read the instructions about the entrance ticket before re-watching the video once more so as to complete it. Participant teachers have devoted a few lessons on this. In addition, teachers have also demonstrated to students how they should work in completing the entrance ticket (e.g. CS1-08112017). This action, together with many others explained below, should help develop both intrinsic and extrinsic motivation (Abeysekeraa & Dawson, 2015).

Teachers should keep the flips short, 5-10', depending on the age of the students to avoid boredom, to trigger students' interests (Gaughan, 2014). Galway et al. (2014) studied how this can in turn affect motivations and hence student achievement levels. Indeed, students didn't like long videos (E.g. '*One of the videos was 1 hour long*!!!' (complaining)- S1.7). Teachers can either edit long ready-made flips or give students specific minutes to watch. Moreover, educators should target to provide flip resources that students like/prefer most, e.g. videos, in order to maintain interest and motivation. Personal contact with the students was also important and appreciated by students (Bergman & Sams, 2008), hence teachers should aim to prepare their own flips if possible. They could also customize ready-made flips, add some humour (young learners loved it) and translate through a voice-over if necessary. Moving the 'lecture' anywhere outside the classroom have proved engaging for the students in other studies as well (e.g. Davies et al., 2013; Smit et al., 2014).

In order to avoid disengagement, teachers should let students know that one of the flips is compulsory and the rest of the resources are optional. Difficult online articles should be avoided, and teachers should not ask students to complete any activity they cannot handle on their own (Sohrabi & Iraj, 2016). Parents may not know how or have the time to help their children: E.g. '*I don't know how to use the laptop…*' (P3.7). Parents have also suggested that teachers should avoid giving too much homework on the same day they give out a flip with an entrance ticket to be completed. Students also showed a preference to online work as they felt more excited working on their tablets (E.g. S4.21). Overall, pre-class activities should be short and simple. Students were more likely to pay more attention to the flip, complete the entrance ticket and come to class prepared for the lesson if this does not take too long (Bergman & Sams, 2008). Learners perceived the usefulness of the flips and the entrance tickets as critical. This was evident in the long list of statements (see Figure 2.3) by Yoshida (2016) on the perceived usefulness of flipped learning. Teachers could also engage the students by asking them to create themselves the entrance ticket, e.g. online quizzes (CS5). The aim should be to promote students' responsibility and control over their own learning (Kovach, 2014).

In-class, teachers could avoid student confusion and boredom by keeping the excitement and engage all students through the IBL activities (Talley & Scherer, 2013). This would make students feel that '*… time passes by so quickly*' (S-CS5-13122017). Teachers should make sure they can revert classroom environment by adapting the activity (e.g. CS1-14032018) and always try to keep students on task. DeLoizer and Rhodes (2016) stressed the significance of offering authentic learning experiences, away from traditional class activities which produce low level of student engagement.

The use of technological equipment vs traditional means (e.g. books/activity books) has been more motivating for the students. Hillman et al. (1994) talked of how student-interface interaction can add to Moore's student-content interaction, student-teacher interaction and student-student interaction to establish an effective learning community. Even though their research was carried out in higher education, results are transferable here. Participant students felt so much more excited working on their tablets and laptops (E.g. CS3-01122017; CS1-2112017). However, considering parents' perceptions, teachers should be cautious with total screen time (E.g. P5.10). Moreover, teachers agreed that a BYOD initiative can lead to more efficiency and student engagement.

The choice of IBL activities also plays a crucial role in students' motivation. Activities should be engaging, based on the flip, '*going beyond the book*'

(*James*), being '*fun and interesting'* (*Tesa & Rosemary*), to avoid boredom and disruptive behaviour (Freeman et al., 2007). Moreover, upper primary students could multitask (CS3-CS5) and have enjoyed it (e.g. CS5-17012018). Therefore, teachers could give out a challenge after an evaluation process. E.g. '*Listen carefully! On Monday we will have a tournament…play until there is a winner*' (T-CS3-23032018). Lastly, the completion of e-portfolios should be an ongoing process. If the e-portfolios takes too long to complete, students complain if they have to complete all of it only at the end of a unit (E.g. CS5). Hence, motivation in the classroom is often overestimated in relation to technology (Housand & Housand, 2012; Koutropoulos, 2011), as it depends heavily on how educators structure the lesson and maintain balance, i.e. IB-FC UDP1: Structure and Flexibility.

All of the above have contributed towards the development of the IB-FC Engagement tool (see Figure 6.12). Self-paced learning, personalized contact and students' skills (IBL and ICT) are recognized as leading parameters which guide further the actions of the teacher in the individual and learning space. The teacher clarifies and guides in both spaces, whereas the interconnection of IB-FC tools exists in many of his actions. E.g. The IB-FC Differentiation tool influences the design of flips and entrance tickets and the IB-FC Engagement tool influences all the actions to keep the excitement on. This interconnection of IB-FC tools will be presented within the IB-FC research framework.

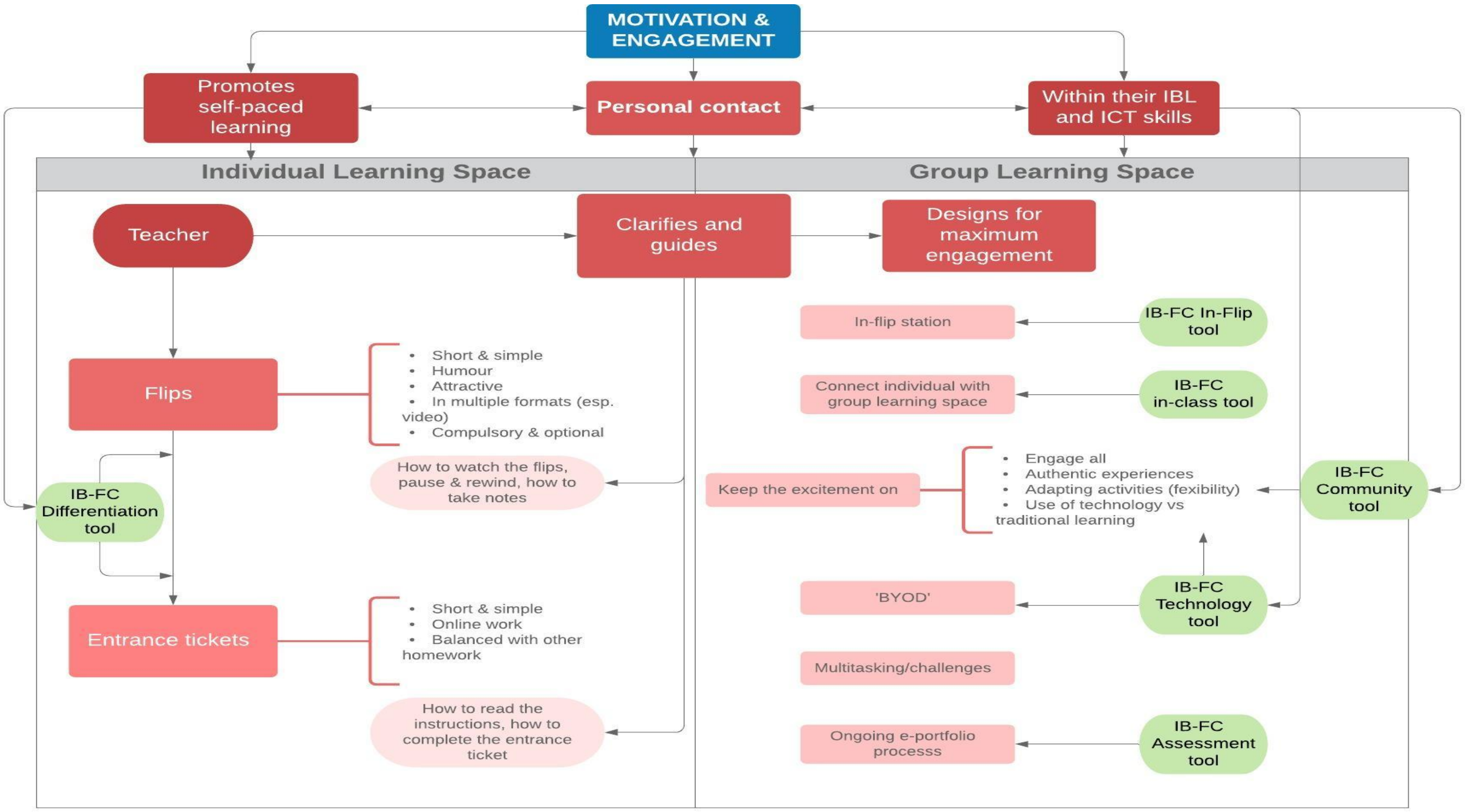


Figure 6.12. *IB-FC Engagement Tool*

6.8 UDP7: Assessment and Evaluation

A mechanism to assess student understanding and address misconceptions at every stage of the learning process should be created (prompt and adaptive feedback).

A mechanism to assess student understanding, one of Brames (n.d.) four design principles for FC (later adopted by Kim et al., 2014) should be pursued, addressing misconceptions at every stage. Throughout the learning process, five main evaluation methods have been identified (see Figure 5.17).

Teacher assessment: At the individual learning space, the completion of short and motivating entrance tickets is necessary (discussed within *IB-FC UDP6: Motivation and Engagement*). This could assist the teacher to evaluate pre-class understanding and address misconceptions (IB-FC *UDP3: Interconnectivity and community*). Teachers should have a look at students' work before coming back to class and students should be aware of it so they can post their work on time (e.g. CS5-21112017). Pre-class assessment could be combined with any other evaluation method. The teachers should provide guidance, feedback and support throughout the learning process (Hwang et al., 2015; Sandberg et al., 2014). E.g.: Participant teachers circulated around the classroom (formative assessment) *to 'keep the students on task'* (*Tesa*) and '*on the right track'* (*Mary).*

Self-assessment: Overall, students should be given a chance to develop the ability to self-evaluate, bearing in mind the marking/assessment criteria, e.g. through rubric forms (see Figure 5.10) or providing solutions on Moodle (see

Figure 6.13). Such a reflection and self-assessment process can form part of formative assessment. E.g. Students would repeat the same quiz again at the end of the lesson (T-CS1-18012018).

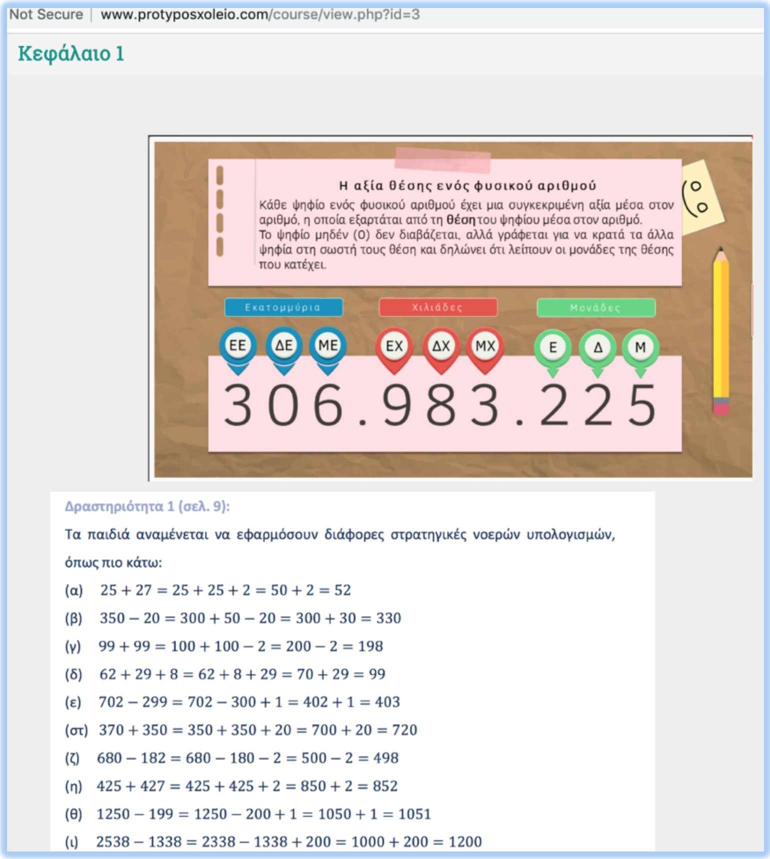


Figure 6.13. *Mathematics solutions on Moodle- Screenshot*

Peer assessment: Students enjoyed giving feedback to their classmates through forums, chats, wikis, online documents or F2F (real time presentation of their work in class). Criteria rubrics could also be used or teachers should ask for descriptive assessment, keeping it simpler for lower-primary students. Evaluation, using success criteria and making valid judgements, belongs to the higher order skills in the Bloom's taxonomy (Zainuddin & Halili, 2016), addressing both self and peer assessment. Supporting learners to achieve this high level of the taxonomy domain is feasible in primary education, even though there are no previous studies to reference to. Lankford (2013) and Nederveld and Berge (2015) elaborated on this at university level.

Computer/online assessment: Many online assessment options could enhance students' ability to self-evaluate and improve their achievement through repetitive assessment, e.g. (i) Drill and Practice exercises; (ii) Questions within the flips; (iii) Completing online quizzes; and, (iv) Answering forum questions. Bergmann and Sams (2012) took a step further and used simulations as part of the evaluation process. In this study, the teachers reported that students usually score higher in a computer-based assessment (e.g. CS5-14032018), possibly associated with instant feedback given.

Whole-class assessment: There have been numerous examples in the observation notes (unlike within the interview transcriptions) speaking of how teachers encouraged students to share their work for feedback purposes by presenting them to the whole class, share it on Moodle forums or the classroom Drive. Continual and immediate feedback serves as scaffolding (e.g. Brunsell & Horejsi, 2013) and students enjoyed having an audience and taking correction notes whilst presenting their work. E.g. '*They read-out their problems and they all decide if each Maths problem was appropriately written*.' (CS5-24012018)

Overall, teacher assessment, whole-class assessment and computer assessment worked better for lower-primary students than peer and self-assessment processes (which was more suitable for upper-primary students). In any case, as a teacher you need to make sure that you give opportunities/time for review and correction of errors after peer/teacher/self-review. Students understand what is needed to be done since the instructor evaluates and gives feedback throughout the learning process (pre-class, in-class, after-class), in order to overcome deficiencies in learning (Kim et al., 2014). Friesen (2009) recognized assessment as one of the first three principles of his Teaching Effectiveness Framework, noting that assessment practices improve student learning and guided teaching.

Findings in the research of Mazur et al. (2015), who adopted the framework in secondary education, indicated both strengths and areas of improvement in assessment practices within an FC model, recommending further action research in FC in K-12 classrooms. Hence, following the current action research in primary education, the following tool (IB-FC Assessment tool) summarizes assessment methods to be adopted for IB-FC implementation in lower and upper primary education with the revision of the initial IB-FC entrance and exit tool (see Figure 6.14).

It is divided into the five main assessment methods explained above (*teacher, self-, peer-, computer and whole-class assessment*), each one them exemplified into the tools a teacher needs to design and the equivalent assessment actions taken by the corresponding agent (teacher, student, peer or all students). For example, to adopt peer assessment, a teacher needs to prepare the *Criteria Rubrics* (tool) in which the students will use to provide

Feedback through forums, chats, wikis, online documents or F2F (Assessment practice).

All forms of assessments constitute to formative assessment which aim to provide guidance, feedback and support to the students throughout the learning process (both at the individual and group learning space). All forms of assessment are also interconnected and can give and borrow aspects from the IB-FC Engagement tool (motivation and assessment are closely linked) and IB-FC In-class tool (assessment can help interconnection of learning spaces and vice-versa). The initial 'IB-FC entrance/exit tickets tool' can supplement the IB-FC Assessment tool with more practical examples.

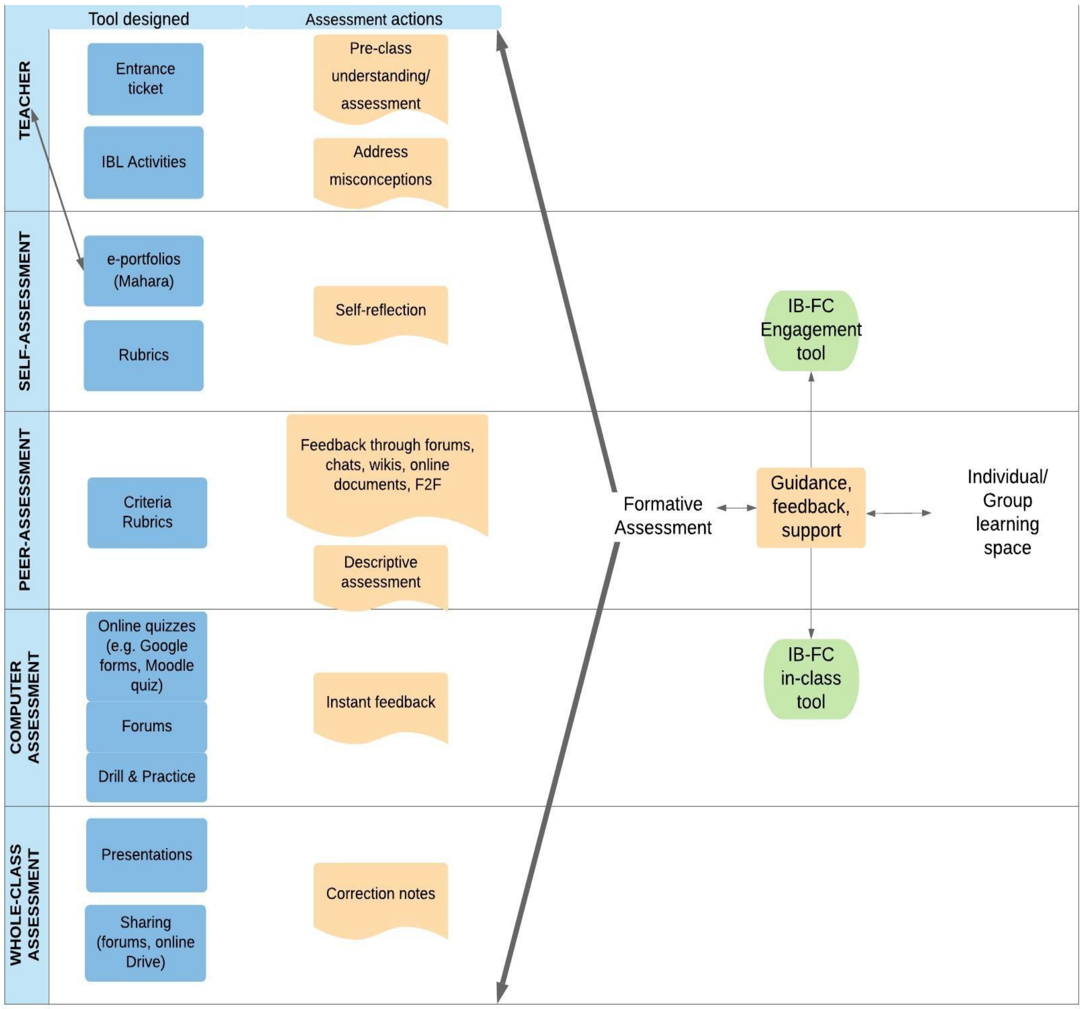


Figure 6.14. *IB-FC Assessment Tool*

6.9 The pedagogical importance of the UDPs and their relation to the IB-FC approach

The major instructional principles behind flipped learning, as a blended form of instruction, are drawing much attention from teachers and leaders around the world (Huang & Lin, 2017). '*By reversing the sequence of instruction, innovative educators are making a change in the way students learn to in order to ensure better use of class time for active and mastery learning*' (Huang & Lin, 2017, p.324). "*Do the purported benefits of flipped classrooms reflect research-based* *principles of effective teaching and learning?*" (Goodwin & Miller, 2013, p. 78). If the answer is yes, then we should look at effective ways to give out the flipped experience and reach today's learners. Although there is a common understanding on "WHAT" the flipped classroom is, there is still work to be done in studying "HOW" to implement the flipped classroom in a way which enhances student learning. The literature review on the flipped classroom has revealed that the majority of studies on FC do not describe pedagogical designs based on strong theoretical ground or pedagogical principles which guide the design, implementation and evaluation of the flipped classroom model (Kim et al., 2014).

Indeed, despite over fifteen years of flipped classroom implementation, design principles have been minimally elaborated upon in relation to diverse disciplinary contexts. In particular, no scientific articles with detailed flipped classroom design principles exist. Bergmann and Sams (2012) have suggested a list of design considerations but these had been limited to technological elements, e.g. '*time to learn new software*'; '*support for administration'*. Their list also mainly defined flipped classroom and added to potential discussion issues on the flipped classroom model, e.g. '*a means to increase interaction and personalized contact time between students and teachers'*.

Attempts by researchers, such as Kim et al. (2014), Brame (n.d.), and Chen and Chang (2017), have focused on the gap for universal design principles but only in higher education. Moreover, currently, the design of flipped classroom has often been limited to adopting mainstream instructional models, e.g. 'First

Principles of Instruction' or standard design principles for digital materials, or merely replacing in-class instruction with video-recorded lectures and using class time for homework (Kim et al., 2014) in secondary and higher education. But what instructional design framework should we use in planning the overall flipped classroom approach in a way which would give a set of universal design principles in primary education? The pedagogical value of the UDPs stated in this research, together with the IB-FC tools developed along them, is thus based on two parameters: (a) That these UDPs and IB-FC tools talk specifically to the primary school teachers, both in theory and practice for IB-FC implementation with the young learners; and, (b) that following these UDPs and IB-FC tools for the design of IB-FC instructions, the teaching process lines-up with the basic principles of contemporary teaching models within the flipped classroom approach, i.e. maintaining the transfer from cognitivism to constructivism for achieving higher order skills of the Bloom's taxonomy, as explained in the literature review in Chapter 2. This is what is presented in the final IB-FC framework in the following chapter as well.

Specifically, *structure and flexibility (UDP1)* is a principle which safeguards teaching effectiveness working as a lens to guide through the reflection on the benefits and challenges of the flipped learning designs, either through the Lesson Template developed (Figure 6.1), the orchestration routines (Figure 6.3) and/or through in-flip methodology. *Simplicity and accessibility* (UDPs) argue that technologies should place no extra workload on students but only enhance their learning experience. They should also be readily available, avoiding the purchase or built-up of new technologies. According to Strayer

(2012, p. 172), '*regular and systematic use of interactive technology*' is also a significant part of an integrated flipped classroom learning design. Winter (2018) emphasized that designing learning for the individual space, and also maintaining *interconnectivity* (UDP3) with the group learning space, should consider such multimedia learning principles (UDP2) if it is to produce cognitive activity (Day & Foley, 2006), also illustrated in the IB-FC technology tool (Figure 6.7). *Community* (UDP3) has been the focus of other FC studies (e.g. Friesen, 2009; Mazur et al, 2015) suggesting that flipped classroom models that emphasize collaborative learning, group work and accessibility can enable and support inquiry-based learning. *Differentiation and personalization* (UDP4) talk of how FC can benefit underperforming or high ability students, also explained by Lo and Hew (2017), mostly through the revision and feedback process offered (Figure 6.10).

Moreover, in a FC approach, students should be able to solve advanced and real-world problems, catering to diverse learners (i.e. *differentiation*), developing the IBL skills (i.e. *Development and progression*-UDP5- Figure 6.11). Course planning (i.e. the design process), out-of-class learning and in-class learning should be going through *Assessment and Evaluation* (UDP7-Figure 6.14), in order to enhance *Motivation and Engagement*. The FC pedagogical design and learning process could be summarized in its practical sense within the corresponding IB-FC tool (The IB-FC Engagement Tool-Figure 6.12) which incorporates all of the IB-FC UDPs, whereas the IB-FC Framework in the next chapter illustrates their interaction within the two learning spaces.

Chapter 7: Conclusion and Implications

7.1 Conclusion

This research aimed to study actual IB-FC implementation in primary school settings. It found that teachers, students and parents have mostly positive experiences and perceptions. Overall, students were satisfied with the FC activities, they all enjoyed the flips and many agreed that the class time interaction through the IBL activities was key to their understanding. Students and teachers perceived that the FC activities become more interesting, motivating and engaging, especially with the use of technology, than traditional class. Teachers enjoyed the design and implementation process and they were willing to offer all the support and guidance the students needed throughout the learning process. Teachers collaborated well with the parents who appreciated the effort and were also willing, happy and supportive towards their children. These findings are in line with many others previous studies.

Contrary to many previous published studies, however, the present study is distinctive in the following ways. First, it tested the feasibility of implementing FC in a primary school context, through an action research methodology within multiple case studies. A majority of previous studies did not explicate any specific conceptual framework to help instructors design their FCs at any level of education (Bishop & Verleger, 2013; Giannakos et al., 2014), not even the few studies which existed in primary education (Aidonopoulou & Sampson, 2017; Gough et al., 2017; Hultén & Larsson, 2016; Kostaris et al., 2017).

Moreover, it is the first time a FC model has been implemented at any level within the educational context of Cyprus. This research proposed and tested the implementation of a combination of FC with IBL in order to address the limitations and challenges of both methodologies and help educators, students and parents *enjoy th*e benefits of both. It provided an initial IB-FC framework, together with IB-FC tools, which the participants used to design their IB-FC lessons. Secondly, very few previous studies have utilized their results to develop design principles for using FC (Kim et al., 2014; O'Flaherty & Phillips, 2015), and none in primary education.

The present study has proposed UDPs based on the practical implementation suggestions arising from students', teacher's and parents' experiences and perceptions as well as any relevant literature. These UDPs have led to the revision and the development of new IB-FC tools presented in the discussion section. The UDPs and the IB-FC tools directed the revision and the enhancement of the initial IB-FC framework presented below (see Figure 7.1).

As explained in Chapter 2, the core support for each learning space is different. The individual learning space instruction, which is teacher-centered, is facilitated through technology. Students have access to teacher-given or teacher-created content such as video tutorials, readings, screencasts, presentations and/or quizzes. The flipped learning methodology in this learning space extends to how students use these sources (e.g. through forum-use, use of note-taking tools) to understand fundamental concepts and ideas. Therefore, cognitive theories supported this part of the framework (Clark & Mayer 2008, p. 5). This fundamental knowledge, attained through multimedia learning principles (Day & Foley 2006), is then applied in the group learning space with the teachers' support/facilitation. Multimedia learning and teacher facilitation, although more present in the individual and group learning space respectively, play a crucial role within the IB-FC framework. Active learning in the group learning space (Baepler et al., 2014) is supported by constructivist theories emphasizing group knowledge construction and 'learning-as-participation' (Sfard, 2009, p. 555).

The arrows in the framework represent how the two learning spaces feed each other, i.e. teacher lectures feed both spaces with the content to be learned and practiced and the learners' inquiries arise both in class and at home and are vital for further investigation activities. Moreover, the four main categories of benefits identified through the literature review, the focus groups discussions and student forum reflections in the pilot study guided the Group Learning Space activities initially, focusing on: *1. How to begin/facilitate the lessons?; 2. What students do during the lessons?; 3. What students can do after the lessons?; 4. What students as a group do during the lessons?.* These categories, clearly presented in the initial research framework (see Figure 2.6), were indeed applicable within the actual research implementation. They are particularly reflected within UDP5: *Development and Progression*.

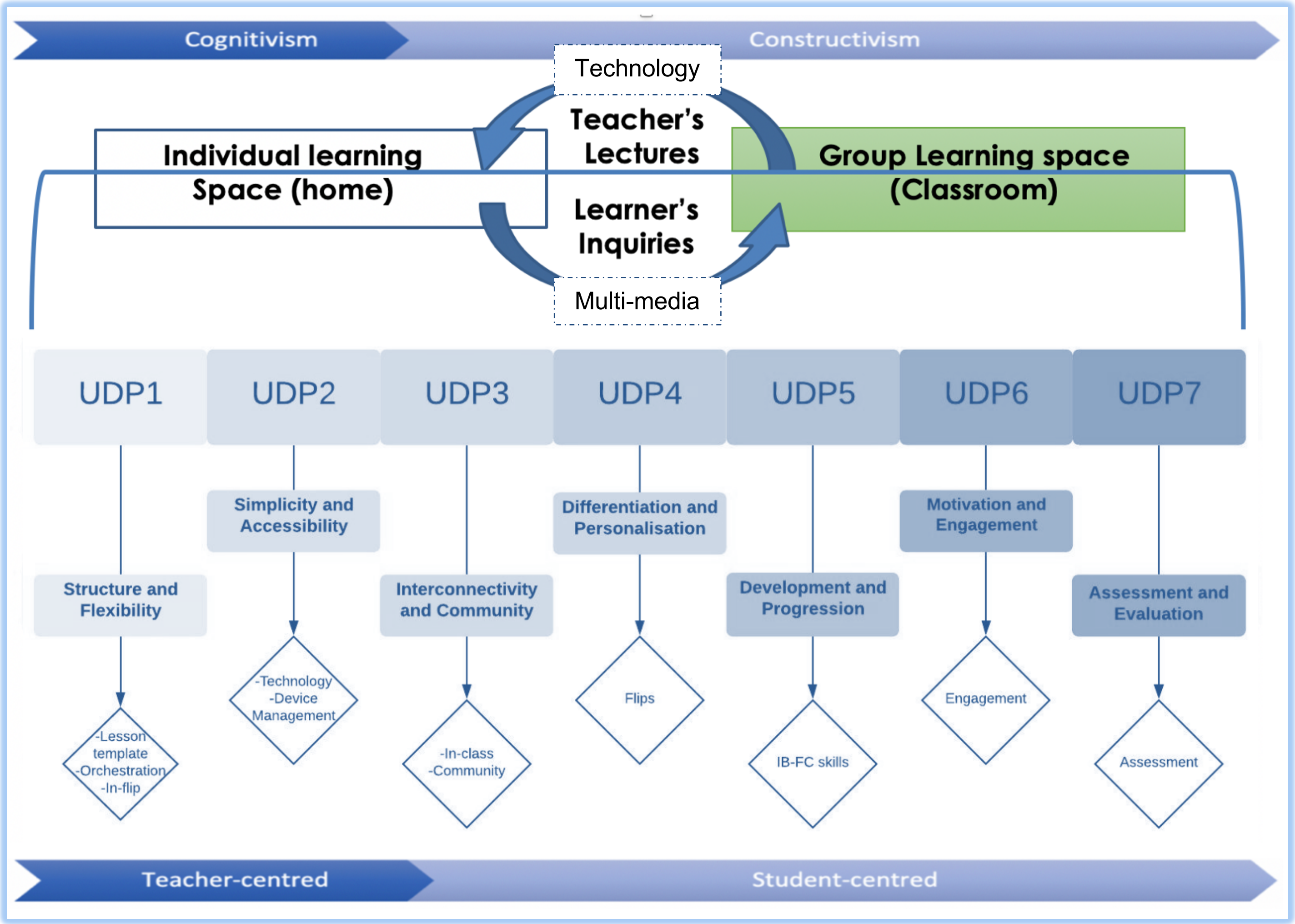


Figure 7.15. *Final IB-FC Framework*

Within the revised and final IB-FC framework, it is clear that not only UDP5, but all seven UDPs are embedded across the individual and group learning space since every IB-FC lesson should be characterized by: *structure and flexibility; simplicity and accessibility; interconnectivity and community; differentiation and personalization; development and progression; motivation and engagement; and, assessment and evaluation*. Under each principle, the revised and new IB-FC tools are incorporated to offer guidance and advice to the teachers to follow the design principles for an effective implementation of the IB-FC methodology. Primary school teachers could also refer to the Appendix of this research where examples of the Lesson Plan Analysis are included (see Appendix 2) and the IB-FC Practical Guide accessible through the research' blog: http://flippedclassroomcyprus.blogspot.com.

7.2 Research Implications

Contribution to current theory for FC in primary education

This research aims to contribute not only to the local research scene on ICT integration models but also to local and international FC research and its combination with IBL literature. In particular, existing FC frameworks have focused mainly on higher and secondary levels of education, leaving a gap in primary education in which this study has addressed in depth, considering the experiences and perceptions of all stakeholders: teachers, students and parents. In fact, it is indeed the only research which has observed so closely the actual implementation process of FC lesson designs in primary education and has 'spoken' to young students and their parents who participated.

The findings of this research make several contributions in that respect, i.e. to current FC literature in primary education. First, its action research design through a multiple-case study approach enabled us to gain in-depth knowledge of primary school teachers', students' and their parents' experiences and perceptions towards the FC teaching pedagogy. Second, this research proposes evidence-based recommendations through the UDPs that might inform an effective implementation of the FC approach in primary education. Findings from this research provide valuable data indicating that using an FC model, such as IB-FC, to deliver content in primary education was associated with a positive learning experience of all stakeholders involved. An implication of this is the increased possibility that implementing the FC model in primary school teaching considering the recommendations and UDPs proposed, i.e. the IB-FC framework in the current research could potentially improve student achievement levels. Moreover, the research has also been innovative in testing the combination of the FC methodology with IBL in primary education and thus offers increased possibilities on how to exploit the extra in-class time saved through FC.

The UDPs provide theoretical and pedagogical implications missing from current FC research, and research in primary education in particular. Past research has mostly dealt with the collection of experiences and perceptions of either teachers or students and has never dealt with providing particular pedagogical principles in how to design and deliver FC at any level of education. The focus has been so far in comparing traditional teaching to FC methodology and the results have never considered the needs of the teachers, students and/or parents at any of the two learning spaces.

Contribution to current practice for FC in primary education

In light of the variability in educational environments, evaluating and developing UDPs for educational methods is complicated. Thus, the design process of IB-FC instructions is vital for a successful implementation (Rotellar & Cain, 2016). Careful consideration needs to be adopted when implementing the IB-FC model in primary education and thus following the IB-FC framework. Professional development and possibly IT support is needed as teaching staff would be expected to understand and use the principles and the tools to create learning activities for both the individual and group learning space.

Since implementing the model might introduce changes in what is considered the norm for teachers, students and parents, resistance from all is likely. Resistance to change and innovation at any level of education could result from a habit towards a current practice. Bovill et al. (2016) spoke of the perceived risk when traditional roles are redefined. Teachers may revolve around the potential workload increase and the challenge of choosing the suitable IBL activities. Students may get out of their *comfort zone* due to the new responsibility that mandates them to stop being passive learners and be more active throughout the learning process. The approach also steps the parents out of their traditional role as their ICT skills matter to the kind of interaction they can have with their children during the pre-class session and the collaboration possibilities with the teacher.

Given these conditions, offering teachers theoretical (IB-FC UDPs) and practical tools (IB-FC tools), through the necessary TPD, may assist in easing the resistance towards implementing the IB-FC model. As the UDP1 suggests, it might to the best benefit to start small when implementing the IB-FC approach to facilitate a smooth transition for not only the students but also teachers and parents. Overall, based on the findings from the current research and the analysis of the UDPs, the educational design of IB-FC instructions in primary education are distinct from the implementation at any other level of education in the following ways and should be deeply considered by educators during the design process:

- Teachers should offer a very well-structured lesson to their young learners, with particular guidelines and orchestration routines followed.
- The creation of in-flip stations, especially for the lower primary students, is necessary to ensure all students gain the basic understanding before proceeding to the IBL activities.
- Flexibility and differentiation according to students' ICT and IBL skills is necessary for the flips, entrance tickets, IBL activities, feedback and evaluation methods adopted. This is to safeguard differentiation and personalisation which is important for both lower and upper primary students.

- Teachers should be able to solve any technical issues arising in class, given that students may not be able to deal with them themselves, by using simple and accessible technologies.
- The interconnection of the individual and the group learning space should be clear and the transfer to the IBL activities meaningful so that young learners can make the cognitive connection.
- A community of young learners should be created by enhancing the collaboration and the interaction of students, teachers and parents between them, given their level of ICT and IBL skills.
- Teachers should design activities which gradually promote the IBL and transversal skills of primary school students so that the model can be effectively implemented at both learning spaces.
- The design should offer maximum motivation and an incentive to students to prepare for class, exploiting technology in an engaging way.
- A simple mechanism to assess student understanding and address misconceptions at every stage of the learning process should be created through prompt and adaptive feedback which the students would be able to easily understand.

Importance of the research in relation to its context.

The current research has taken place in Cyprus primary schools which is my country of origin and the context I have worked in for the past 16 years as a primary school teacher. Thus, discussing how this PhD research could be taken forward is valuable. A brief overview of the Cyprus educational context has been given in Chapter 1 of the thesis, especially in regards to technology integration. In short, it has been pointed out there is a high level of available infrastructure which is not translated into effective ICT integration at any level of education (Eteokleous, 2008), especially in primary education where a horizontal ICT integration model is in place. Hence, contemporary ICT integration models should be pursued. Indeed, the flipped classroom pedagogy might offer valuable benefits for future developments of teaching and learning methods in Cyprus education, and in Cyprus primary education in particular. Unfortunately, Cyprus students might be relatively inexperienced in mastering active learning methods, since delivering the content of the curriculum is heavily dependent on the traditional lecture method (Vrasidas, 2015). In addition, their self- study skills might be low. Based on these assumptions, students are likely to face unbearable challenges in tackling this new teaching method and its unfamiliar requisites. Therefore, it is extremely important that the educator aims to support students in building their skills and competence in order for them to be successful in learning through the flipped classroom teaching method. Additionally, it would be recommended that the flipped classroom teaching method is introduced gradually in lower primary classes because doing so might have a positive effect on students' expectations in the later years due to the skills developed through experiencing this learning approach at an early stage. All in all, this research provides valuable information to local practitioners in how to achieve this in the best way possible, by minimizing the design challenges and maximizing the possibilities.

Beyond the local level, the research contributes to international empirical research in FC and IBL by providing implications, through IB-FC tools, for primary school teachers who may wish to practice FC learning with their young students. The results of this study have provided a better understanding of technology use within primary education and IB-FC learning practice in particular. It can in turn contribute towards avoiding ad hoc, ineffective technology-integration attempts, such as the ones adopted by MOEC for years (e.g. Eteokleous, 2008; Vrasidas, 2015).

Finally, the findings and the discussion of this study may contribute to deeper understanding of the future research in the FC area.

7.3 Limitations and Future Research

Despite the contributions of this study, the following are acknowledged as limitations:

- IB-FC implementation has altered the typical traditional lesson by introducing smart devices not previously used during the lesson, in practically all of the case studies. Students have felt excited about this new blended-learning methodology/environment and were willing to watch the flips, prepare for class and complete the entrance and exit tickets. Thus, they were much more willing to work given the use of their devices, no matter the content sometimes and/or structure of the lesson. This could have introduced bias to the study findings as it might have positively impacted the class dynamic, particularly students' experiences and perceptions. In Mary's classroom this could not have been a limitation, given the pilot implementation the year before.

- Participant teachers have been purposely selected. They all had average to very good experience in ICT integration projects, given the blended learning methodology of IB-FC. They were also very willing to adopt the methodology, no matter the time needed for the design of the FC instructions and the preparation of the flips. They also had the knowledge needed for reflecting on ICT integration models and flexibly adjusting FC and IBL activities during implementation. This means that the findings of the study might not be able to be generalised and exploited by a large number of teachers in our schools today who lack the professional experience in implementing any ICT integration model in their lessons and/or don't have the time or the willingness to do so. Hence, future research may concentrate in the professional development of teachers prior to implementation, based on the IB-FC framework and the IB-FC UDPs. TPD should particularly focus in how the seven UDPs can work during the preparation of the educators for teaching in line with FC methodology and the National Curriculum. Moreover, focus on the assessment and improvement of the ICT skills of the teachers could also assist towards a more effective FC initiative in primary schools.
- The participants of the study had been Grade 3 to Grade 6 students. Hence, results do not allow for any additional in-flip conditions/routines that may need to be adopted for younger students, especially for first

graders during '*First Reading and Writing*' process. The proposed IB-FC UDPs can form the base for a future study which will test their effectiveness in designing IB-FC lessons for Grade 1 students, or even younger, extending research results to include reception students as well. Filling this gap could be a real challenge since this is a completely empty field in FC literature. Grade 1 and reception students have no ICT skills developed and the adoption of such an approach involves parents-teacher collaboration to a bigger extend than the one tested in this research. Hence, the current research has offered an initial view in how parents can be part of the learning process at the individual learning space and could be valuable for the design of such a future intervention.

- The researcher's classroom (*Mary*'s classroom) was purposively involved in the pilot study of the research and in numerous ICT projects the year before IB-FC implementation. Thus, they have been more mature and have previously experienced various online learning environments. In addition, their ICT skills, autonomy and readiness for IB-FC activities might have been better than those in the other case studies. This has favoured overall results and may have caused a bias. Future research may concentrate in processing and analysing separately case studies of students with well-developed ICT skills as it makes IB-FC implementation easier, especially if orchestration routines, such as device management, are already developed.

Furthermore, some issues in this discussion constitute additional implications for future research. In particular, several other challenges found in the implementation of the IB-FC model should be addressed by future researchers, such as the suitability of ready-made videos and the management of disengaged students. Therefore, this study should be continued and developed to fill in the literature on the IB-FC model in primary education. Future study could also concentrate on a variety of research designs not employed in this research such as experimental research, ethnography, design and developmental research (DDR) or design-based research. A systematic DDR research may use the principles proposed in this research and produce further a variety of models, beyond IB-FC, for FC practices. Furthermore, future studies of FC may apply to more subjects in primary education such as other foreign languages and physical education. Different other online platforms could also be tested or LMSs for comparing a possible more effective implementation of the FC in primary education, looking at student achievement levels or other success criteria. Further Web 3.0 tools for the share and promotion of student-student and student-teacher interaction could be assessed and may provide a differentiated and improved IB-FC model, adding to the IB-FC UDPs.

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Appendix One: Literature Review, Table of Analysis

Flipped Classroom Literature: Sample Screenshots

Authors' names Year of publication	Type of document	Location of the university of first author	Type of research	Type of education	Main findings of the theoretical search
Abeysekera & Dawson, 2015	Article, Higher Education Research & Development	Melbourne, Australia	Propositions developed from theories	Higher	Flipped approaches might improve student motivation and help manage cognitive standards.
Aidonopoulou & Sampson, 2017	Article, Educational Technology & Society	Greece	Action research	Primary	Encouraging evidence for the potential benefits of the FC model in primary school social studies courses.
Al-Zahrani, 2015	Article, British Journal of Educational Technology	Saudi Arabia	Survey questionnaire	Higher	Positive students' perceptions were reported, but students had a limited preparation for this strategy.
Araujo et al, 2017	Article, Educational Technology & Society	Turkey	4 case studies	Higher	The type of homework in a flipped classroom is important (i.e. how interactive the videos are).
Baepler et al., 2014	Article, Computers and Education	Minnesota	Survey	Higher	Impoved student perceptions and achievement.
Baker, 2000	Conference paper	Ohio	Action research	Higher	Increased interactivity and collaboration (online and in the classroom) through FC
Bauer-Ramazani et al., 2016	Article- TESOL Journal	Vermont, U.S.A	Action research	Higher	Benefits and challenges of FC implementation in TESOL courses.
Bergmann & Sams, 2008	Article, Learning & Leading with Technology	Colorado	Action research (vodcast model)	Secondary	Benefits of vodcasts in FC classes (Chemistry).
Bergmann & Sams, 2012	Book	Colorado	Self-reflection	Secondary	What, how and why to implement each FC model illustrated.
Bergmann & Sams, 2015	Book	Colorado	Self-reflection	Secondary	What, how and why to implement each FC model illustrated (Maths).
Bergmann & Sams, 2016	Book	Colorado	Self-reflection	Primary	What, how and why to implement each FC model illustrated (Elementary).
Bergmann & Sams, 2017	Article International Society for Technology in Education	Colorado	Self-reflection	Secondary	FC and student engagement.
Berrett, 2012	Article, Education Digest	Colorado	Theoretical	Higher	How to improve traditional lecturing through FC.
Borrmann, 2014	Master thesis	Iowa, USA	Literature Review	Higher	FC can afford students a more engaging environment that can lead to higher achievement and a better preparedness for 21st-century learning and work environments.
Brunsell & Horejsi, 2013	Article, The Science Teacher			Higher	

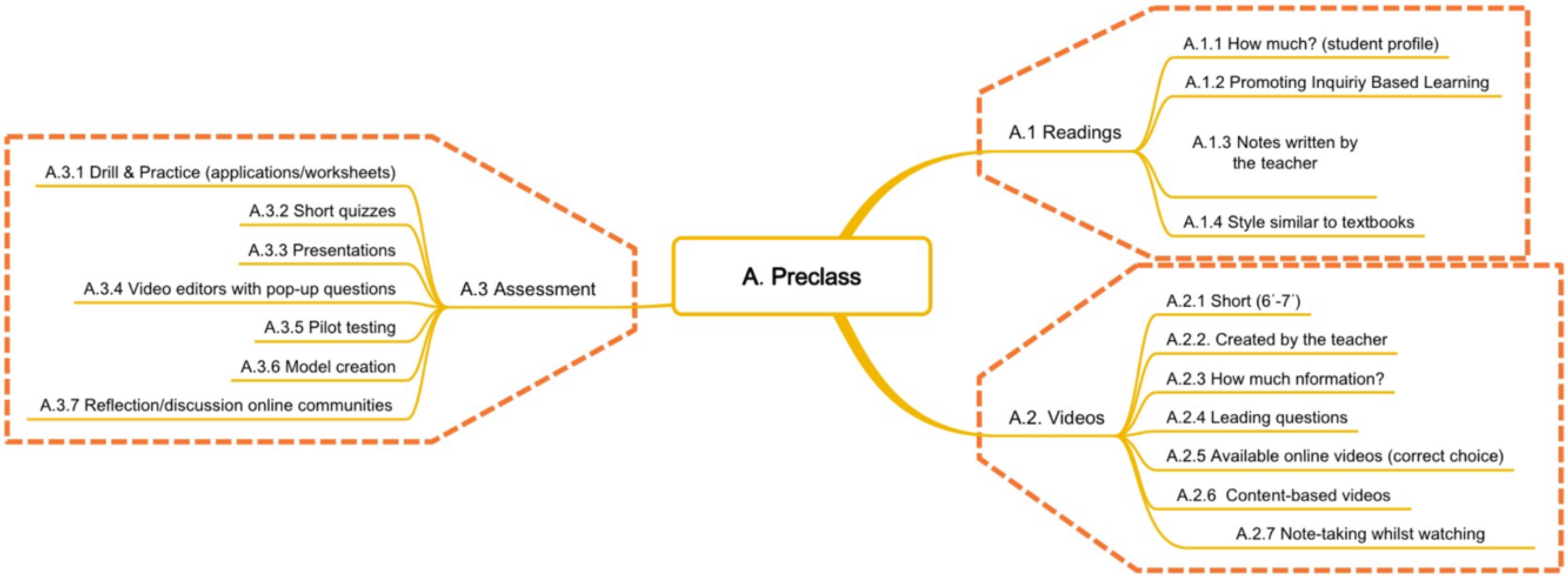
Chen & Summers, 2015	Article, The International Review of Research in Open and Distributed Learning	New York, USA	Mixed Methods	Higher	Gaps in the humanities, social science, and natural science academic areas in terms of the number of video lessons and viewership.
Chen et al., 2014	Article, Computers and Education	Singapore	Survey and interviews	Higher	Achievements and challenges of FC.
González-Gómez et al., 2016	Article, Springer, Journal of Science and Educational Technology	Spain	Surveys	Higher	FC students performed higher on average. Most students had a favorable perception for FCs.
Gough et al., 2017	Article- Journal of Educational Technology	Minnesota, USA	Quantitative (survey)	K-12	Benefits and best practices in regard to the flipped classroom instructional model (teachers' perceptions).
Hall & DuFrene, 2016	Article- SAGE, Business and Professional Communication Quarterly	U.S.A.	Qualitative- interviews	Higher	FC-Perceptions from instructors: insights gained, best practices, and recommendations.
Hao, 2016	Article - ELSEVIER	Taiwan	Survey	Middle school	Middle schoolers' flipped learning readiness in EFL classrooms.
Horner & Curto, 2016	Book	New York	Mixed methods	Higher	Practical guide for photo-teachers.
Hultén & Larsson, 2016	Article, Routledge, Scandinavian Journal of Educational Research	Sweden	Interviews	Primary & Secondary	Characteristics and objectives of FC.
Huang & Lin, 2017	Article, Educational Technology & Society	Taiwan	Mixed research methods (surveys & interviews)	Higher	Positive students' perceptions on FC.
Hwang & Lai, 2017	Article, Educational Technology & Society	Taiwan	Quasi-experiment	Primary	FC promoted the students' self-efficacy for learning mathematics, but also improved their learning achievement; FC benefited the lower self-efficacy more than the higher self-efficacy students.
Kim et al., 2014	Article- ELSEVIER	Los Angeles, USA	Mixed methods empirical study	Higher	Identified nine FC design principles.
Kim, 2016	Article, Routledge, The interpreter and translator trainer	Busan, Korea	Surveys	Higher	The Community of Inquiry (CoI) instrument was employed to investigate how students perceive their traditional and flipped learning experiences.
Kostaris et al., 2017	Article, Educational Technology & Society,	Athens-Greece	Action research	K-12	Evidence for potential advantages of FC in students' cognitive learning outcomes related to subject domain knowledge, the exploitation of teaching time during the classroom face-to-face sessions, the students' level of motivation, as well as their level of engagement.

Kurt, 2017	Article, Educational Technology & Society	Turkey	Quasi-experimental study (Qualitative and quantitative)	Higher	Higher level of self-efficacy beliefs and better learning outcomes for the experimental group (flipped classroom).
Lage et al, 2000	Article, Routledge, The Journal of Economic Education	U.S.A.	Literature review	All levels	Positive student perceptions.
Lo & Hew, 2017	Article, Educational Technology & Society	Hong Kong	Two exploratory studies	Middle school	FC: significant learning gains.
Love et al, 2015	Article, PRIMUS	Nebraska, Omaha, U.S.A.	Survey	Higher	Student perceptions of the flipped/IBL classroom model.
Mark, 2015	Article, Journal of College Teaching & Learning	U.S.A.	Action-research, surveys	Higher	Careful curriculum design, both content and methods learning objectives can be taught and mastered with Flipped Classroom methods.
Mazur et al., 2015	Article, Canadian Journal of Learning and Technology	Calgary, Canada	Action-research	Secondary education	Flipped classroom models that emphasize collaborative learning, group work and accessibility can enable and support inquiry-based learning.
Morgan, 2014	Article, Childhood Education	Mississippi, U.S.A	Literature review	All levels	Successful and unsuccessful FC implementations.
Song et al, 2017	Quest editorial, Educational Technology & Society	Hong-Kong	Review of articles in the - synthesis	All levels	Review of articles' methodologies and results.
Tawfik & Lilly, 2015	Article, Springer	Chicago	Case-study	Higher	Important themes related to FC: relevance, reciprocal learning, teacher as facilitator, and self-efficacy.
Wang et al., 2010	Article, Springer, Early Childhood Journal	NY, U.S.A	Literature review	Early-childhood	Citing kinds of technologies for early childhood.
Winter, 2018	Article - Springer	Honolulu, USA	Survey	Middle school	Technology-based content in FC may lead to increased motivation and improved performance. FC benefits average achieving students through differentiated instruction.
Yoshida, 2016	Article- International Journal of Information and Education Technology	Japan	Questionnaire survey	Higher	14 usefulness statements of students for FC.
Zainuddin & Halili, 2016	Article- International Review of Research in Open and Distributed Learning	Indonesia	Literature review	All levels	Various fields and technology tools were practiced and used in the flipped classroom approach, showing positive results (motivation, engagement, interaction etc.).
Zhai et al., 2017	Article, Educational Technology & Society	Chine	Quantitative (survey)	Higher	Personalized Learning Climate, learners' Prior Learning Experience is a far more significant antecedent for predicting their satisfaction in FCs.

Inquiry-Based Learning Literature: Sample Screenshot

Authors' names Year of publication	Type of document	Location of the university of first author	Type of research	Type of education	Main findings of the theoretical search
Barak & Asad, 2012	Article, Research in Science & Technological Education	Israel	Classroom observations, attitude questionnaire & achievement exam	Secondary	Project based learning-advantages.
Çakiroglu & Özturk, 2017	Article, Educational Technology & Society	Turkey	Qualitative data (observation form, discussion messages and interviews)	Higher	Suggestions for using problem-based activities in flipped learning.
Capaldi, 2015	Article, PRIMUS	Valparaiso, Chile	Discussion	Higher	How FC and IBL can be combined.
Chen & Chang, 2017	Article, Educational Technology & Society	Taiwan	Quantitative	Higher	Development and instructional design of the SOP2 Model.
Jong, 2017	Article- Educational Technology & Society	Hong-Kong	Quasi- experimental study on	Higher	FSIL (Flipped" Social Inquiry Learning) had different degrees of positive effects on the high, moderate, and low academic-achieving participants.
Maaß & Doorman, 2013	Article, ZDM Mathematics Education	Germany	Design-based research	Professional Development	The design of a focused and flexible model for dissemination and implementation of IBL
Song & Kapur, 2017	Article- Journal of Educational Technology & Society	Switzerland	Quasi-experimental study comparing	Middle school	Proposed the "productive failure-based flipped classroom" pedagogical design.

Appendix Two: Initial IB-FC Tools (Visuals and Tool Guides)- Screenshots



A. IB-FC Pre-class framework- Πλαίσιο σχεδιασμού ΔΜ-ΑΤ 'πριν το μάθημα'

A.1 Pre-class readings- Πηγές 'πριν το μάθημα'

- A.1.1 How much is too much? It depends on the level of the class, the age of the students and the students themselves. Be cautious!
  A.1.1 Τι και πόσο είναι αρκετό; Εξαρτάται από το επίπεδο της τάξης, την ηλικία των μαθητών και τους ίδιους τους μαθητές. Πρέπει να είστε ιδιαίτερα προσεκτικοί!
- A.1.2 Texts can be IBL (promoting active learning, critical thinking etc.) so as not to expose students to a plethora of material that the teacher may not intend to expose them to.
  A.1.2 Τα κείμενα πρέπει να προωθούν την ΔΜ (π.χ. προώθηση ενεργής μάθησης, κριτικής σκέψης κλπ.) ούτως ώστε οι μαθητές να μην εκτίθενται σε περιεχόμενο που δε θα αξιοποιήσει ο εκπαιδευτικός στην τάξη.
- A.1.3 Each educator should write the notes or make the videos himself so as to share enough to get them interested or involved in the material without sharing all of its secrets (Capaldi, 2015).
  A.1.3 Ο κάθε εκπαιδευτικός πρέπει να φτιάχνει τις δικές του σημειώσεις και το περιεχόμενο για τους μαθητές του ή τα βίντεο ούτως ώστε να κρατά αμείωτο το ενδιαφέρον των μαθητών του χωρίς να προδίδει τα 'μυστικά' του μαθήματος.
- A.1.4 Style the notes to be similar to a textbook, or you could even make them like a worksheet or fill-in-the-blank, which students can turn in for assessment (IBL framework).
  A.1.4 Οι σημειώσεις και το περιεχόμενο να προσαρμόζεται στα πρότυπα του βιβλίου του μαθήματος. Το περιεχόμενο θα μπορούσε να είναι σε μορφή φυλλαδίου εξάσκησης (αντίστοιχο λογισμικό) ή συμπλήρωσης των κενών που θα παραδώσουν οι μαθητές ως δελτίο εισόδου στο μάθημα.

A.2 Pre-class videos/Βίντεο ΄πριν το μάθημα΄

- A.2.1 Keep the videos short (6-7 minutes)
  A.2.1 Τα βίντεο να είναι σύντομα (6-7 λεπτά)
- A.2.2 Create the videos yourself as students prefer to see their teacher talk to them
  A.2.2 Δημιούργησε ο/η ίδιος/ίδια τα βίντεο αφού οι μαθητές προτιμούν να βλέπουν το/τη δικό/δική τους δασκάλα να τους μιλά.
- A.2.3 Decide how much or how little information to give in the video, especially for IBL.
  A.2.3 Αποφάσισε το πόσες πληροφορίες θα δίνει το βίντεο, ειδικά για το μέρος της διερευνητικής μάθησης.
- A.2.4 Ask leading questions in the videos and let students share their answers through chats/forums/presentations etc.
  A.2.4 Υπόβαλε σημαντικά ερωτήματα στα βίντεο και άσε τους μαθητές να διαμοιράζονται τις απαντήσεις τους μέσω των συνομιλιών σε πραγματικό χρόνο (chat), ομάδων συνομιλίας (φόρουμ), παρουσιάσεων κλπ.
- A.2.5 Use videos available online if they align with your teaching goals, content and promote IBL.
  A.2.5 Χρησιμοποίησε έτοιμα βίντεο διαθέσιμα στο διαδίκτυο τα οποία συμβαδίζουν με τους στόχους και το περιεχόμενο του μαθήματός σου αλλά επιτρέπουν ταυτόχρονα και την διερευνητική μάθηση ως επέκταση.
- A.2.6 Engage or interest students by occasionally assigning videos that are not specifically content-based, e.g. television show videos which discuss similar issues.
  A.2.6 Κράτησε αμείωτο το ενδιαφέρον των μαθητών σου. Μπορείς να αναρτάς κατά περιόδους βίντεο τα οποία δεν είναι αποκλειστικά και μόνο περιεχόμενο/ύλη μαθήματος, π.χ. αποσπάσματα από εκπομπές τηλεόρασης που συζητούν παρόμοιο θέμα με αυτό του μαθήματος σας.

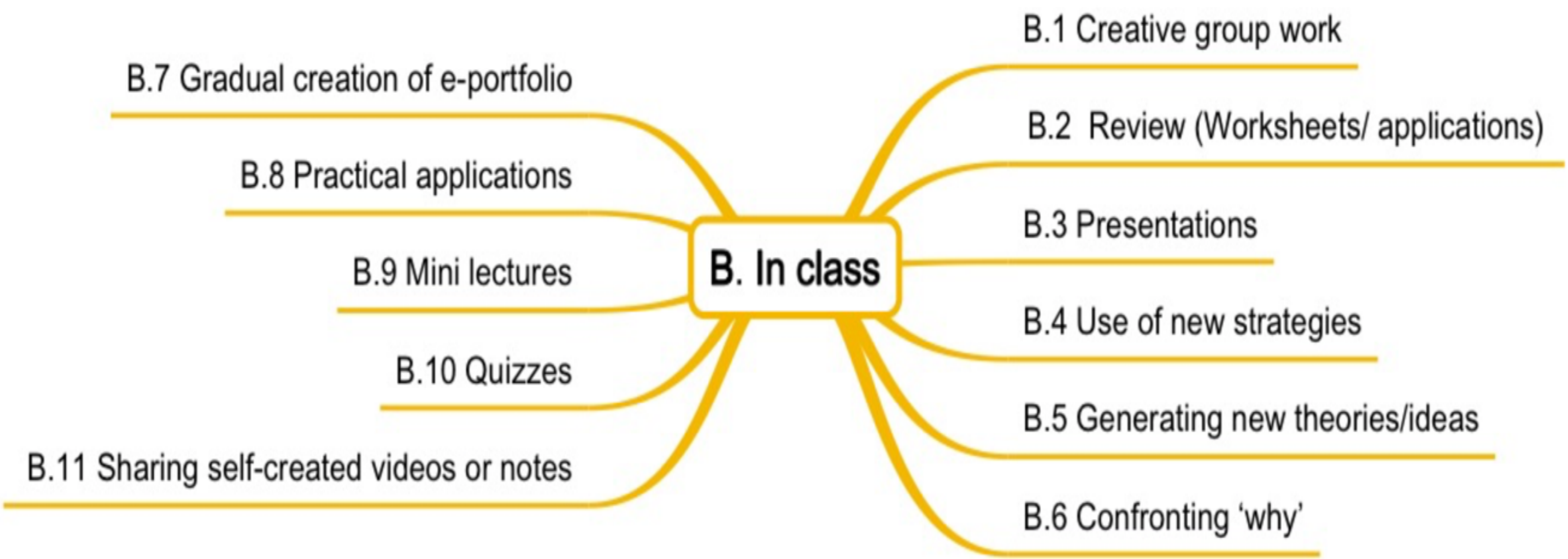
- A.2.7 For accountability purposes, Bergmann & Sams (2012) recommend having students take notes while viewing the videos and requiring students to hand in those notes. Model to students how to view the sample videos actively and provided note-taking strategies. Ask students to pause and rewind the video while taking notes and to review parts of the video that might at first be difficult to comprehend.
  A.2.7 Για λόγους λογοδοσίας, οι Bergmann & Sams (2012) συνιστούν να ζητούμε από τους μαθητές να παίρνουν σημειώσεις καθώς παρακολουθούν τα βίντεο και να απαιτούμε να τις παραδίδουν Δείξε στους μαθητές τον τρόπο που θα μπορούσαν να παρακολουθούν ενεργά τα βίντεο και ποιες στρατηγικές καταγραφής σημειώσεων μπορούν να χρησιμοποιήσουν. Ζήτα από τους μαθητές να κάνουν παύση και να γυρίζουν το βίντεο πίσω καθώς παίρνουν σημειώσεις και να επαναλαμβάνουν τα κομμάτια του βίντεο που ίσως στην αρχή να φαίνονται δύσκολο να τα κατανοήσουν.

A.3 Pre-class assessment/Αξιολόγηση 'πριν το μάθημα'

Students need to know that their work will be checked. For example:

Οι μαθητές πρέπει να γνωρίζουν ότι οι εργασίες τους θα ελέγχονται. Για παράδειγμα:

- A.3.1 Use drill-and-practice worksheets or software (eg. Fill-in the blanks) so they can also be used as entrance tickets
  A.3.1 Χρησιμοποίησε φύλλα ή λογισμικά εξάσκησης-και-πρακτικής (π.χ. συμπλήρωσης κενών) που μπορούν να χρησιμοποιηθούν και ως δελτία εισόδου στο μάθημα.
- A.3.2 Use two-question quizzes at the end of the reading or beginning of class
  A.3.2 Χρησιμοποίησε σύντομα κουίζ 2-ερωτήσεων στο τέλος της ανάγνωσης των πηγών ή στην αρχή του μαθήματος στην τάξη.
- A.3.3 Ask students to present the answers to pre-class questions once they arrive in class
  A.3.3 Ζήτα από τους μαθητές να παρουσιάσουν τις απαντήσεις τους στα ερωτήματα 'πριν το μάθημα' αμέσως μόλις αρχίσει το μάθημα στην τάξη.
- A.3.4 Use video editors which allow the video to stop and pose pop-up questions which need to be answered for proceeding further.
  A.3.4 Χρησιμοποίησε επεξεργαστές βίντεο που επιτρέπουν να το σταματάς και να υποβάλλεις ερωτήματα που θα εμφανίζονται ξαφνικά και που πρέπει να απαντηθούν για να προχωρήσει το βίντεο περαιτέρω.
- A.3.5 Pilot videos: take volunteers or call on students to describe what the reading or video was generally about and how they answered a specific problem.
  A.3.5 Πιλοτική εφαρμογή των βίντεο: Χρησιμοποίησε εθελοντές ή ζήτα από άλλους μαθητές να περιγράψουν εν συντομία γενικά το περιεχόμενο του κειμένου που διάβασαν ή του βίντεο που παρακολούθησαν και αξιολόγησε το πώς απάντησαν σε συγκεκριμένο πρόβλημα.
- A.3.6 Allow students to generate prototypes, examples or conjecture based on given examples, which they then bring to class and share.
  A.3.6 Επέτρεψε στους μαθητές να δημιουργούν τα δικά τους 'πρότυπα', παραδείγματα ή συμπεράσματα με βάση δοσμένα παραδείγματα, τα οποία θα 'φέρουν' την επόμενη μέρα στην τάξη και θα τα μοιραστούν με τους υπόλοιπους.
- A.3.7 Use video discussion communities which allow students to respond to a video through a video, feedback/response, i.e. ignite discussion e.g. https://info.flipgrid.com/
  A.3.7 Χρησιμοποιήστε κοινότητες σχολιασμού βίντεο που επιτρέπουν στους μαθητές να απαντούν σε θέματα που υποβάλλονται σε συγκεκριμένο βίντεο δημιουργημένο από τον εκπαιδευτικό μέσω βίντεο, σχολίων ή ανατροφοδότησης, π.χ. https://info.flipgrid.com/


B. In class
B.1 Creative group work
B.2 Review (Worksheets/ applications)
B.3 Presentations
B.4 Use of new strategies
B.5 Generating new theories/ideas
B.6 Confronting ‘why’
B.7 Gradual creation of e-portfolio
B.8 Practical applications
B.9 Mini lectures
B.10 Quizzes
B.11 Sharing self-created videos or notes

B. IB-FC In-class activities – Δραστηριότητες μέσα στην τάξη

This ‘in-class’ activities tool is for providing overall guidance on the potential activities employed within class time. The ‘In-class tasks- Inquiry Based Learning’ tool supplements this tool.
Αυτό το πλαίσιο σχεδιασμού ‘στην τάξη’ αποτελεί μία συνολική προσέγγιση των δραστηριοτήτων που μπορούν να γίνουν μέσα στην τάξη. Το πλαίσιο ‘Εργασίες στην τάξη- Διερευνητική Μάθηση’ (Παράρτημα F) συμπληρώνει αυτό το πλαίσιο.

- **B.1 Set up creative group work** (e.g. problems from the pre-class reading or video, or new problems first seen in class)
  B.1 Αναθέστε δημιουργικές ομαδικές εργασίες (π.χ. προβληματισμούς που προκύπτουν από τη μελέτη κειμένων ή βίντεο πριν το μάθημα, ή νέοι προβληματισμοί που ανατίθενται στην τάξη).

- **B.2 Give worksheets/software applications** in class that review the pre-class assignment but also take it a step further.
  B.2 Δώστε στην τάξη φύλλα εργασίας που είναι επανάληψη των εργασιών ‘πριν το μάθημα’ αλλά που επεκτείνουν το μάθημα ένα βήμα παραπέρα.

- **B.3 Presentations**: ask students to present their work to the rest of the class

  B.3 Παρουσιάσεις: ζητήστε από τους μαθητές να παρουσιάσουν την εργασία τους στην υπόλοιπη τάξη.

- **B.4 Give students to solve harder examples using new strategies** not seen in the reading or video. Working through difficult questions often generates a rich discussion within groups.

  B.4 Δώστε στους μαθητές να επιλύσουν πιο δύσκολα παραδείγματα χρησιμοποιώντας στρατηγικές που δεν παρουσιάστηκαν στις πηγές ή στο βίντεο. Η εργασία στην επίλυση πιο δύσκολων ερωτημάτων ενθαρρύνει την ομαδική συζήτηση.

- **B.5 Use guided questions and further examples** so that students can use them to compare and generate ideas and/or theorems
  B.5 Χρησιμοποιείστε καθοδηγητικές ερωτήσεις και περαιτέρω παραδείγματα ούτως ώστε οι μαθητές να μπορούν να τις χρησιμοποιήσουν για σύγκριση ή επινόηση νέων ιδεών/θεωριών.

- **B.6 Help them confront the "why"** of a theorem on their own leading to a deeper understanding
  B.6 Βοήθησέ τους προς τη διερεύνηση του 'γιατί' στη θεωρία που διδάσκεται από μόνοι τους με στόχο τη βαθύτερη κατανόηση.

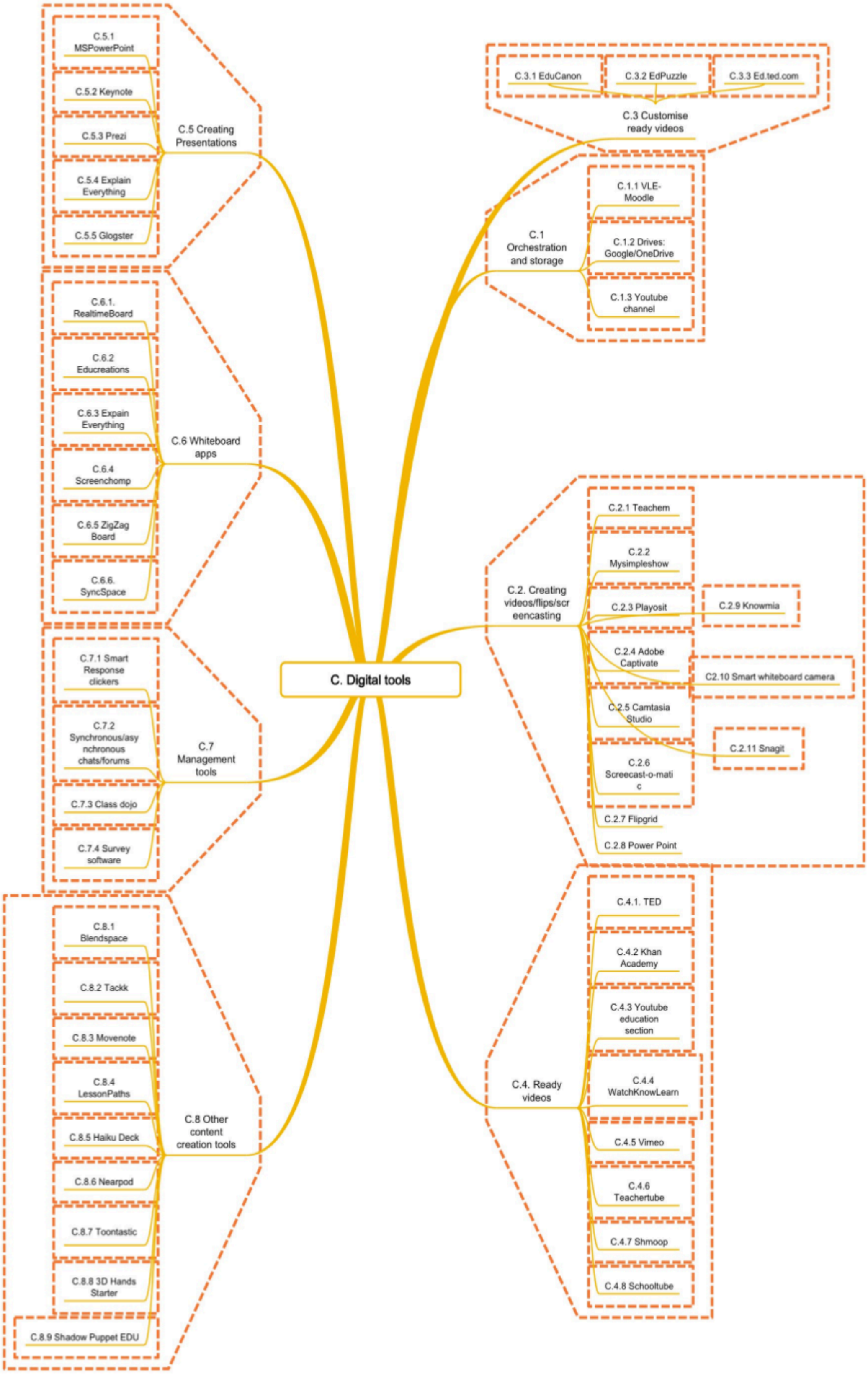
- **B.7 E- Portfolio**: Help them to express the importance of what they are learning in words, within their portfolio and provide their own practical examples.
  B.7 Ηλεκτρονικός Φάκελος Επιτευγμάτων: Βοήθησέ τους να εκφράσουν λεκτικά τη σημασία αυτού που μαθαίνουν, εντός των πορτφόλιο (φακέλου επιτευγμάτων) τους και να παραθέτουν τα δικά τους πρακτικά παραδείγματα.

- **B.8 Use application problems and hands-on exercises** and activities to help students take charge of their learning experience.
  B.8. Χρησιμοποίησε προβλήματα, ασκήσεις και δραστηριότητες πρακτικής εφαρμογής για να βοηθήσεις τους μαθητές να νιώσουν υπεύθυνοι για τη δική τους μαθησιακή εμπειρία.

- **B.9 Short mini-lectures** can be used to summarize a topic with which students have struggled, draw together various strands of the material, and appease students who are resistant to these new (to them) ways of running a class. Create a fill-in the blank outline for your lecture to cover any material left uncovered.
  B.9. Σύντομες 'διαλέξεις'/παραδόσεις μαθήματος μπορούν να χρησιμοποιηθούν για να δώσουν την περίληψη ενός θέματος στο οποίο μπορεί να δυσκολεύτηκαν οι μαθητές, να εξαχθούν τα πιο βασικά συμπεράσματα, καθησυχάζοντας τους μαθητές που ίσως είναι πιο διστακτικοί σε σχέση με τον νέο τρόπο διδασκαλίας. Δημιουργήστε ένα διάγραμμα ελέγχου για τη 'διάλεξή' σου για να βεβαιωθείς ότι έχεις καλύψει όσα χρειάζονται για το μάθημα.

- **B.10 Quizzes**: Quizzes can provide more meaningful input and even have a say in what direction they would like in-class discussion to take (Herreid & Schiller, 2013). They can also motivate students to complete their out-of-class work. Out-of-class quizzes, beginning of class quizzes, participation points for in- class activities, and the use of pointed questions at the beginning of class to determine students' understanding of the topic and areas that need reinforcement and clarification.
  B.10 Κουίζ: Τα κουίζ μπορούν να αποτελέσουν ένα ουσιώδες στοιχείο για το μάθημα και να καθορίσουν και την τροπή που θα πάρει η συζήτηση ή το μάθημα στην τάξη (Herreid & Schiller, 2013). Μπορούν επίσης να δώσουν κίνητρο στους μαθητές σου για να ολοκληρώνουν τις εργασίες 'πριν το μάθημα'. Χρήση κουίζ 'εκτός τάξης', κουίζ στην αρχή του μαθήματος, βαθμοί συμμετοχής στις δραστηριότητες 'στην τάξη' και η χρήση στοχευμένων ερωτήσεων στην αρχή του μαθήματος για να καθορίσουν το επίπεδο κατανόησης του θέματος από τους μαθητές και των περιοχών που χρειάζονται ενίσχυση και διευκρίνιση.

- **B.11 Share recording and note-taking with class members**. Students could share on a forum or through the Moodle platform their important recordings or notes taken during reading, listening or watching the content given. Students can then discuss important or stand-out notes (notes which deviate from the medium) to see if they agree or disagree and maybe this can trigger content lesson as well.


C. Digital tools
C.1 Orchestration and storage
C.1.1 VLE-Moodle
C.1.2 Drives: Google/OneDrive
C.1.3 Youtube channel
C.2. Creating videos/flips/screencasting
C.2.1 Teachem
C.2.2 Mysimpleshow
C.2.3 Playosit
C.2.4 Adobe Captivate
C.2.5 Camtasia Studio
C.2.6 Screecast-o-matic
C.2.7 Flipgrid
C.2.8 Power Point
C.2.9 Knowmia
C2.10 Smart whiteboard camera
C.2.11 Snagit
C.3 Customise ready videos
C.3.1 EduCanon
C.3.2 EdPuzzle
C.3.3 Ed.ted.com
C.4. Ready videos
C.4.1. TED
C.4.2 Khan Academy
C.4.3 Youtube education section
C.4.4 WatchKnowLearn
C.4.5 Vimeo
C.4.6 Teachertube
C.4.7 Shmoop
C.4.8 Schooltube
C.5 Creating Presentations
C.5.1 MSPowerPoint
C.5.2 Keynote
C.5.3 Prezi
C.5.4 Explain Everything
C.5.5 Glogster
C.6 Whiteboard apps
C.6.1. RealtimeBoard
C.6.2 Educreations
C.6.3 Expain Everything
C.6.4 Screenchomp
C.6.5 ZigZag Board
C.6.6. SyncSpace
C.7 Management tools
C.7.1 Smart Response clickers
C.7.2 Synchronous/asynchronous chats/forums
C.7.3 Class dojo
C.7.4 Survey software
C.8 Other content creation tools
C.8.1 Blendspace
C.8.2 Tackk
C.8.3 Movenote
C.8.4 LessonPaths
C.8.5 Haiku Deck
C.8.6 Nearpod
C.8.7 Toontastic
C.8.8 3D Hands Starter
C.8.9 Shadow Puppet EDU

C. IB-FC digital tools- Ψηφιακά εργαλεία IB-FC

C.1 Basic tools for orchestration and storage/ Βασικά εργαλεία ενορχήστρωσης και αποθήκευσης

- **C.1.1. VLE-Virtual Learning Environment/Διαδικτυακό Περιβάλλον Μάθησης- Moodle**
  In this research Moodle will be used as the main online platform for all 10 schools participating. All tools and features embedded in Moodle will be explained to teachers in terms of promoting the implementation of the IB-FC framework.
  C.1.1. Διαδικτυακό περιβάλλον μάθησης- Moodle
  Σε αυτή την έρευνα θα χρησιμοποιήσουμε την πλατφόρμα τηλεκπαίδευσης Moodle και για τα 10 σχολείο που θα συμμετέχουν στην έρευνα. Όλα τα εργαλεία και οι εφαρμογές που είναι ενσωματωμένες στο Moodle θα παρουσιαστούν στους δασκάλους ως προς τον τρόπο αξιοποίησής τους κατά την εφαρμογή του μοντέλου IB-FC.

- **C.1.2 Drives**- OneDrive, Google Drive etc.: Many advantages over traditional text processing programs, such as real-time automatic updates visible to all users, enhancing robust discussion and sharing. Drives can be embedded into Moodle. You can create a Drive for your class, with a common username and password so as to facilitate document creation, storage, sharing, co-editing, self/teacher/peer assessment.
  C.1.2 Μονάδες αποθήκευσης (Drives, π.χ. OneDrive, GoogleDrive κλπ.): Έχουν πολλά πλεονεκτήματα σε σχέση με τα 'παραδοσιακά' προγράμματα επεξεργασίας κειμένου, όπως την αυτόματη ενημέρωση των αρχείων σε πραγματικό χρόνο σε όλους τους χρήστες, προωθώντας τη συζήτηση και συνεργασία. Τα Drives μπορούν να ενσωματωθούν εντός της πλατφόρμας Moodle. Μπορείς να δημιουργήσεις ένα Drive για την τάξη σου, με κοινό όνομα χρήστη και κωδικό για να διευκολύνει όλους όσον αφορά τη δημιουργία και αποθήκευση αρχείων, το διαμοιρασμό, την ταυτόχρονη επεξεργασία, την αξιολόγηση από το δάσκαλο, την αυτοαξιολόγηση και ετεροαξιολόγηση.

- **C.1.3 Youtube**: It is ideal for first-time flippers. It offers a user-friendly, universally understood platform for taped lectures and other educational videos. So, you can create your classroom's Youtube channel as long as you create a new Google account for your classroom (which could be the same as the one you will all use for Google Drive) or have a more personalized account if you don't want your students to be able to upload their own videos. In any case, you can have both. One for you to upload your flips and one for your classroom to allow student upoload. You can structure coursework according to topic and create student "playlists" while enjoying basic video editing features, such as captioning, sound-tracking and trimming/stabilizing.
  If you don't want to, or cannot, post to YouTube, other video hosting sites are available, such as Vimeo, TeacherTube, or Screencast.com. You can also post videos to the school website or to a learning management system (LMS).
  C.1.3 Youtube: Είναι ιδανικό για εφαρμογή αντεστραμμένης τάξης για πρώτη φορά. Προσφέρει μια πολύ φιλική προς το χρήστη πλατφόρμα για να ανεβάζετε τις βιντεογραφημένες διαλέξεις/παραδόσεις σας καθώς και άλλα δικά σας εκπαιδευτικά βίντεο. Άρα μπορείτε να δημιουργήσετε το κανάλι της τάξης σας αφού πρώτα φτιάξετε ένα λογαριασμό Google για την τάξη σας (που θα μπορούσε να είναι ίδιος με αυτό του Drive σας) ή να έχετε κάποιο άλλο δικό σας λογαριασμό αν δε θέλετε να μην έχουν τη δυνατότητα κοινοποίησης και οι δικοί σας μαθητές. Μπορείτε φυσικά να έχετε 2 λογαριασμούς, ένα προσωπικό κανάλι για να ανεβάζετε τα δικά σας βίντεο και ένα για

C. 2 Creating videos/flips/screencasting-Δημιουργία βίντεο/φλιπ/καταγραφές οθόνης

- **C.2.1 Teachem**: http://teachem.com
  Building classes around Youtube videos. You can create your own videos or source it from YouTube itself. Flashcards and time-stamped 'smartnotes' complement video learning.
  Δόμηση μαθήματος με δικά σου ή έτοιμα βίντεο από το YouTube. Τα βίντεο ενισχύονται με κάρτες/εποπτικά ή 'έξυπνες' σημειώσεις.

- C.2.2 Mysimpleshow: https://mysimpleshow.com
  Create explainer videos online
  Δημιουργία επεξηγηματικών βίντεο διαδικτυακά

- C.2.3 Playposit: https://www.playposit.com/dash
  Create videos and chat for students- to make sure they watch it.
  Δημιουργείστε βίντεο και chat για τους μαθητές για να βεβαιωθείτε ότι τα έχουν παρακολουθήσει.

- C.2.4 Adobe Captivate: http://www.adobe.com/cy_en/products/captivate.html
  eLearning design platform to create fully responsive eLearning content
  Πλατφόρμα για σχεδιασμό διαδραστικού εκπαιδευτικού περιεχομένου.

- C.2.5 Camtasia Studio: https://camtasia-studio.en.softonic.com

Perhaps the most popular screencasting technology available, Camtasia Studio is now in its eighth incarnation and has remained up-to-date with educational trends. Teachers can source new and existing screen-captures, PowerPoint presentations, webcam videos and even video games to create coursework that features multi-track timelines, music, animation and a variety of other visual effects. Quiz-creation and sharing across mobile and tablet devices are included in Camtasia Studio,

Ίσως η πιο γνωστή τεχνολογία καταγραφής οθόνης. το Camtasia Studio είναι τώρα στην όγδοη εκδοχή του και είναι προσαρμοσμένο στις πλέον σύγχρονες εκπαιδευτικές τάσεις. Οι δάσκαλοι μπορούν να δημιουργήσουν δικές τους καταγραφές οθόνης ή να χρησιμοποιήσουν υφιστάμενες, να έχουν πρόσβαση σε παρουσιάσεις Power Point ή βιντεοπαιχνίδια για να δημιουργήσουν το υλικό τους που χαρακτηρίζεται από πολύ-επίπεδες χρονογραμμές, μουσική, κινούμενα σχέδια και μια γκάμα από εφέ οθόνης. Υπάρχει επίσης διαθέσιμη η επιλογή για δημιουργία κουίζ και διαμοιρασμός για συσκευές χειρός (κινητά τηλέφωνα, ταμπλέτες) εντός του Camtasia Studio.

- C.2.6 Screencast-o-matic: https://screencast-o-matic.com
  Screencasting software
  Λογισμικό καταγραφής οθόνης

- C.2.7 Flipgrid https://info.flipgrid.com
  Flipgrid helps you create a video discussion community for your classroom that supercharges your students' voices. You add the topics, your students respond with short videos, and everyone engages!
  Το Flipgrid βοηθά στη δημιουργία βίντεο με κοινότητας συζήτησης για την τάξη σας δίνοντας δύναμη στη φωνή των μαθητών σας. Μπορείτε να προσθέσετε θέματα, οι μαθητές σας να απαντήσουν μέσα από τη δημιουργία βίντεο και έτσι όλοι συμμετέχουν ενεργά.

- C.2.8 MS PowerPoint- Use slides and screen-recording
  C.2.8 MS PowerPoint- Χρησιμοποιείστε διαφάνειες και καταγραφή οθόνης

- C.2.9 Knowmia (www.knowmia.com): A comprehensive app that allows for simple screen recording and annotation.
  C.2.9 Knowmia (www.knowmia.com): Εφαρμογή για απλή καταγραφή οθόνης και προσθήκη σχολίων

- C.2.10 Interactive whiteboard camera: Use the camera incorporated in the toolcase of your interactive whiteboard.
  C.2.10 Κάμερα διαδραστικού πίνακα: Χρησιμοποίησε τη κάμερα που βρίσκεται στην εργαλειοθήκη του διαδραστικού σου πίνακα.

- C.2.11 Snagit: https://www.techsmith.com/screen-capture.html: Screen casting software
  C.2.10 Snagit: https://www.techsmith.com/screen-capture.html
  Πρόγραμμα καταγραφής οθόνης

  Tips for effective screencasting: https://www.youtube.com/watch?v=l6LiTpHurYc

  One advantage of tablet devices is that it is easy to write directly onto the presentation. For many of the apps you can upload a presentation to the tablet and then record the presentation. The tablet interface is an ideal choice when you need to annotate over pictures or want to have typical chalkboard features. Ένα πλεονέκτημα των ταμπλέτων είναι ότι είναι εύκολο να γράψεις απευθείας πάνω στην παρουσίαση. Για πολλές από τις πιο πάνω εφαρμογές αυτό που μπορεί να γίνει είναι να ανεβεί η παρουσίαση στην ταμπλέτα και να βιντεογραφηθε. Το λογισμικό των ταμπλέτων είναι ιδανική επιλογή όταν πρέπει να προσθέσεις σχόλια σε φωτογραφίες ή αν θες απλά να γράψεις όπως γράφεις πάνω σε πίνακα

C.3 Customize ready online videos- Προσαρμογή έτοιμων βίντεο

There are numerous tools available that can let you take a YouTube video and "make it your own" by embedding questions (such as C.3.1 EduCanon or C.3.2 EdPuzzle) or delivering them with a tool like C.3.3 ed.ted.com, where you can build a lesson including questions and discussions around a YouTube video.

Υπάρχουν πάρα πολλά εργαλεία που σου επιτρέπουν να 'εξατομικεύσεις' ένα βίντεο στο Youtube, ενσωματώνοντας μέσα ερωτήσεις (όπως το C.3.1 EduCanon ή το C.3.2 EdPuzzle) ή χρησιμοποιώντας εφαρμογές όπως το C.3.3 ed.ted.com όπου μπορείς να κτίσεις ένα μάθημα συμπεριλαμβάνοντας ερωτήσεις ή συζητήσεις σε σχέση με ένα έτοιμο βίντεο στο Youtube.

C.4 Ready videos- Έτοιμα βίντεο

- C.4.1 TED: http://www.ted.com/
- C.4.2 Khan Academy: https://www.youtube.com/user/khanacademy
  Be sure to check the wealth of subject-specific channels they have to offer as well – look on the right hand side of the screen when you first click on the above link.
  Βεβαιωθείτε ότι έχετε ρίξει μια ματιά στο περιεχόμενο του καναλιού στο κάθε γνωστικό αντικείμενο- κοιτάξετε στη δεξιά πλευρά της οθόνης μόλις μεταβείτε στον πιο πάνω σύνδεσμο.
- C.4.3 Youtube's Education Section: https://www.youtube.com/education
- C.4.4 WatchKnowLearn: http://www.watchknowlearn.org/
- C.4.5 Vimeo: www.vimeo.com/
- C.4.6 Teachertube: https://www.teachertube.com/
- C.4.7 Shmoop: www.shmoop.com/
- C.4.8 Schooltube: www.schooltube.com/

C.5. Creating presentations/ Δημιουργία παρουσιάσεων

- C.5.1 MSPower Point
- C.5.2 Keynote Mac
- C.5.3 Prezi: https://prezi.com
- C.5.4 Explain Everything: https://explaineverything.com/
- C.5. 5 Glogster: www.glogster.com/
- Multimedia posters/Διαδραστικές αφίσες

C. 6 Whiteboard Apps/ Εφαρμογές διαδραστικού πίνακα

- C.6.1 RealTimeBoard: https://realtimeboard.com

For ipads

- C.6.2 Educreations: https://itunes.apple.com/app/educreations-interactive-whiteboard/id478617061
- C.6.3 Explain Everything: https://itunes.apple.com/app/explain-everything/id431493086
- C.6.4 Screenchomp: https://itunes.apple.com/app/screenchomp/id442415881
- C.6.5 ZigZag Board: https://itunes.apple.com/app/zigzag-board-a-collaborative/id400171627
- C.6.6 SyncSpace: https://itunes.apple.com/app/syncspace/id408672838

C.7. Management tools/Εργαλεία διαχείρισης

- C.7.1 Smart response clickers/ Μηχανάκια τηλεκαταγραφής απαντήσεων
- C.7.2 Synchronous & Asynchronous chats/ Σύγχρονες (σε πραγματικό χρόνο) & ασύγχρονες συνομιλίες (σε μη-πραγματικό χρόνο)
- C.7.3 Class dojo: https://www.classdojo.com
- C.7.4 Survey software eg./Προγράμματα μικροέρευνας π.χ. https://www.polleverywhere.com/

C.8 Other Content Creation Tools/ Άλλα εργαλεία για δημιουργία περιεχομένου

There are many other types of tools that can be used to create digital learning content. In addition to many great web based apps *(for example, check out the 3 minutes intro's to C.8.1 Blendspace, C.8.2. Tackk, C.8.3 Movenote, and C.8.4 LessonPaths you'll find here)*, there are plenty of good iPad apps as well. Here's a few favorites.

Υπάρχουν πολλά άλλα εργαλεία διαφορετικού τύπου που μπορούν να χρησιμοποιηθούν για δημιουργία ψηφιακού μαθησιακού περιεχομένου. Εκτός από πολλές διαδικτυακές εφαρμογές (για παράδειγμα, ρίξε μια ματιά στις 3λεπτές εισαγωγές στο C.8.1 *Blendspace, C.8.2 Tackk, C.8.3 Movenote, και C.8.4 LessonPaths ΕΔΩ)* υπάρχουν επίσης πολύ καλές εφαρμογές για iPad. Μερικά πιο γνωστά είναι τα ακόλουθα, ενώ μπορείτε να βρείτε και τον αντίστοιχο σύνδεσμο της κάθε εφαρμογής για άλλου είδους συσκευές, π.χ. :

- C.8.5 Haiku Deck (https://www.haikudeck.com/): An alternative slide deck creation app/Μία εφαρμογή εναλλακτικής δημιουργίας διαφανειών παρουσίασης.

- C.8.6 Nearpod (https://www.nearpod.com/): In addition to being able to create Nearpod presentations quickly by importing PDFs, Google Slides, or PowerPoint decks, Nearpod also provides ready to use Common Core aligned lesson content. Πέρα από την επιλογή για δημιουργία παρουσιάσεων εισάγοντας αρχεία PDF, Google Slides, ή PowerPoint, το Nearpod παρέχει και έτοιμο εκπαιδευτικό περιεχόμενο.

- C.8.7 Toontastic (https://itunes.apple.com/app/toontastic/id404693282): Great free app for create cartoons, which offer many possibilities for teaching and learning (check out the article "Dozens of Ways to Use Comics and Cartoons in the Classroom" for lots of ideas). Πολύ καλή εφαρμογή για δημιουργία κινούμενων σχεδίων, που προσφέρει πολλές δυνατότητες για διδασκαλία και μάθηση (ρίξε μια ματιά για πολλές εισηγήσεις αξιοποίησης στο άρθρο "Dozens of Ways to Use Comics and Cartoons in the Classroom).

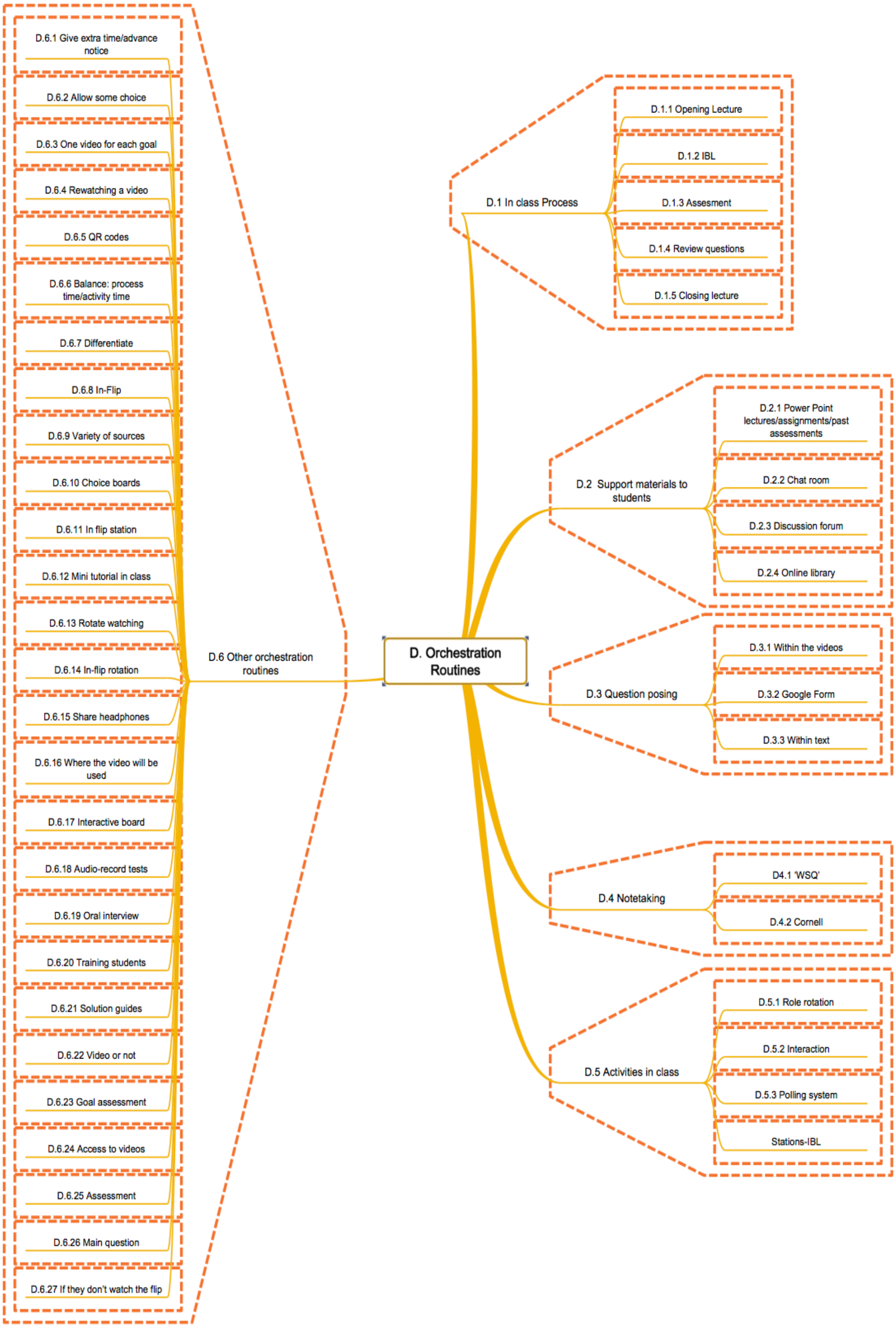
- C.8.8 30 Hands Starter (https://itunes.apple.com/app/30hands/id605013231): Drag photos, images, or video clips around the desktop into the order of the story, then record audio over each image. The resulting presentation can be published to the Camera Roll or uploaded to their collaborative learning site. 'Τραβήξτε' φωτογραφίες, εικόνες ή βιντεοκλιπ στην επιφάνεια εργασίας για εισαγωγή στην ιστορία σας και ηχογραφήστε ήχο για κάθε εικόνα. Η τελική παρουσίαση μπορεί να δημοσιευτεί στο Camera Roll ή να της ανεβάσετε στο Moodle ή σε οποιοδήποτε άλλο συνεργατικό διαδικτυακό περιβάλλον.

- C.8.9 Shadow Puppet EDU (https://itunes.apple.com/app/shadow-puppet-edu/id888504640): This is a fun tool for creating videos and Kids and teachers alike seem to really appreciate it. Αυτό είναι ένα διασκεδαστικό εργαλείο για δημιουργία βίντεο που θα απολαύσουν και τα παιδιά και οι δάσκαλοι.

For a wealth of other ideas and resources that will help you create great learning content, I strongly suggest checking out Kathy Schrock's Digital Storytelling Resources page.

Για πολύ περισσότερες ιδέες και πηγές που θα σε βοηθήσουν να δημιουργήσεις απίθανο μαθησιακό περιεχόμενο, εισηγούμε να ρίξεις μια ματιά στην ακόλουθη σελίδα: out Kathy Schrock's Digital Storytelling Resources page.

TIP: https://www.skoletube.dk/ (many tools in there, eg. Animoto etc. /πολλά εργαλεία σε αυτό το σύνδεσμο, π.χ. Animoto κλπ.)


D. Orchestration Routines
D.1 In class Process
D.1.1 Opening Lecture
D.1.2 IBL
D.1.3 Assesment
D.1.4 Review questions
D.1.5 Closing lecture
D.2 Support materials to students
D.2.1 Power Point lectures/assignments/past assessments
D.2.2 Chat room
D.2.3 Discussion forum
D.2.4 Online library
D.3 Question posing
D.3.1 Within the videos
D.3.2 Google Form
D.3.3 Within text
D.4 Notetaking
D4.1 'WSQ'
D.4.2 Cornell
D.5 Activities in class
D.5.1 Role rotation
D.5.2 Interaction
D.5.3 Polling system
Stations-IBL
D.6 Other orchestration routines
D.6.1 Give extra time/advance notice
D.6.2 Allow some choice
D.6.3 One video for each goal
D.6.4 Rewatching a video
D.6.5 QR codes
D.6.6 Balance: process time/activity time
D.6.7 Differentiate
D.6.8 In-Flip
D.6.9 Variety of sources
D.6.10 Choice boards
D.6.11 In flip station
D.6.12 Mini tutorial in class
D.6.13 Rotate watching
D.6.14 In-flip rotation
D.6.15 Share headphones
D.6.16 Where the video will be used
D.6.17 Interactive board
D.6.18 Audio-record tests
D.6.19 Oral interview
D.6.20 Training students
D.6.21 Solution guides
D.6.22 Video or not
D.6.23 Goal assessment
D.6.24 Access to videos
D.6.25 Assessment
D.6.26 Main question
D.6.27 If they don't watch the flip

D. IB-FC orchestration routines: Ρουτίνες ενορχήστρωσης

Important tips for a well organized and well orchestrated IB-FC model implementation.

Σημαντικές οδηγίες για μια καλά οργανωμένη και ενορχηστρωμένη εφαρμογή του μοντέλου IB-FC.

Although we know that the lecture is not the best means of communicating information to students, sometimes direct instruction has a place. However, embrace Universal Design for Learning (UDL), a learning theory that originated at Harvard University. The basic tenets of UDL are providing students with multiple means of representation, multiple means of expression, and multiple means of engagement.

Αν και η μετωπική διδασκαλία (αλλιώς 'διάλεξη') δεν είναι ο καλύτερος τρόπος επικοινωνίας πληροφοριών προς τους μαθητές, κάποιες φορές η άμεση διδασκαλία είναι η καλύτερη επιλογή. Αξιοποιείστε όμως τις αρχές του Καθολικού Σχεδιασμού, μια θεωρία μάθησης που ξεκίνησε από το Πανεπιστήμιο Χάρβαρντ. Οι κύριες αρχές έχουν να κάνουν με την προσφορά πολλαπλών μορφών αναπαράστασης, πολλαπλών μορφών έκφρασης και πολλαπλών μορφών ενεργούς μάθησης.

D.1 In class process/Πορεία διδασκαλίας στην τάξη (Figure 1/Διάγραμμα 1)

-Lecture for 10 minutes if they have questions/ Διάλεξη 10' για τυχόν απορίες
-IBL/ Διερευνητική Μάθηση
-Assessment (self-peer-teacher): e.g. worksheet assessed for correctness/ Αξιολόγηση (αυτοαξιολόγηση, ετεροαξιολόγηση): π.χ. αξιολόγηση φύλλου εργασίας
-Review questions: επαναληπτικές ερωτήσεις
-Lecture if there are final questions: διάλεξη/κλείσιμο αν υπάρχουν ερωτήσεις

Figure 1: In class teaching steps-an example/ Ενδεικτική πορεία εργασίας στην τάξη

D.2 Support materials available for students/ Υποστηρικτικό υλικό

- Students should have access to support materials such as:/ Οι μαθητές πρέπει να έχουν πρόσβαση σε υποστηρικτικό υλικό όπως:
    - D.2.1 The **PowerPoint lectures, assignments and past assessments**.
      D.2.1 Διαλέξεις σε μορφή Power Point, τις εργασίες και προηγούμενες αξιολογήσεις.
    - D.2.2 The VLE front page can have a **chat room** where, during certain hours of the week, you could be available online to answer any questions.
      D.2.2 Η αρχική σελίδα του Διαδικτυκού Περιβάλλοντος Μάθησης (Moodle) μπορεί να έχει ένα δωμάτιο σύγχρονης συνομιλίας όπου, για συγκεκριμένες ώρες τις εβδομάδας μπορείς να είσαι διαθέσιμος και να απαντάς σε οποιεσδήποτε ερωτήσεις.
    - D.2.3 A **discussion forum** for each section of the course so students could discuss applications of the course material in more detail than class time allowed.
      D.2.3 Ένα φόρουμ σε κάθε ενότητα του μαθήματος για να μπορούν οι μαθητές να συζητούν εφαρμογές του περιεχομένου του μαθήματος σε μεγαλύτερη λεπτομέρεια, πέρα από το χρόνο που δίνεται στην τάξη.
    - D.2.4 The course homepage could contain a **library of additional (online and offline) resources** for students as well as optional, **interactive quizzes on each topic for students to test their knowledge of the material.**
      D.2.4 Η σελίδα του κάθε μαθήματος μπορεί να περιέχει επιπρόσθετες πηγές (διαδικτυακές και μη) για τους μαθητές αλλά και επιλογές σε σχέση με διαδραστικές μικρές αξιολογήσεις για κάθε θέμα για να ελέγχουν οι μαθητές τις γνώσεις τους γύρω από συγκεκριμένο περιεχόμενο.

D.3 Question posing- Ερωτήματα προς τους μαθητές

- **D.3.1 Within the videos** (embedded) or after watching them (e.g. in forums, worksheets or forms like Google forms etc.) questions can be posed for assessment purposes (to help the teacher check if they have watched the video, to assist for self-assessment etc.). One way to structure this is: two questions can be related specifically to the current content and may be designed to engage students and promote their thinking rather than just repeating a definition or something similarly passive. The third question can always the same:
  What did you find difficult or confusing about this section? If nothing was difficult or confusing, what did you find most interesting? Please be as specific as possible.

  D.3.1 Μέσα στα βίντεο (ενσωματωμένα) ή μετά από την παρακολούθησή τους (π.χ. μέσα στα φόρουμ, φύλλα εργασίας ή φόρμες, π.χ. το Google Forms) μπορούν να υποβληθούν ερωτήματα για σκοπούς αξιολόγησης (π.χ. για να ελέγξεις αν οι μαθητές έχουν παρακολουθήσει το βίντεο, για αυτοαξιολόγηση κλπ.). Ένας τρόπος που μπορείς να ακολουθήσεις είναι ο εξής: δύο ερωτήματα μπορούν να σχετίζονται άμεσα με το περιεχόμενο και μπορούν να μην είναι απλά ερωτήματα αναπαραγωγής αλλά επέκτασης ή διερεύνησης περισσότερο. Η τρίτη ερώτηση μπορεί να είναι πάντα η ίδια: *'Τι βρήκες δύσκολο ή τι σε μπέρδεψε; Αν όλα ήταν κατανοητά και εύκολα, τότε τι βρήκες πιο ενδιαφέρον; Να είσαι όσο πιο συγκεκριμένος/νη γίνεται .'*

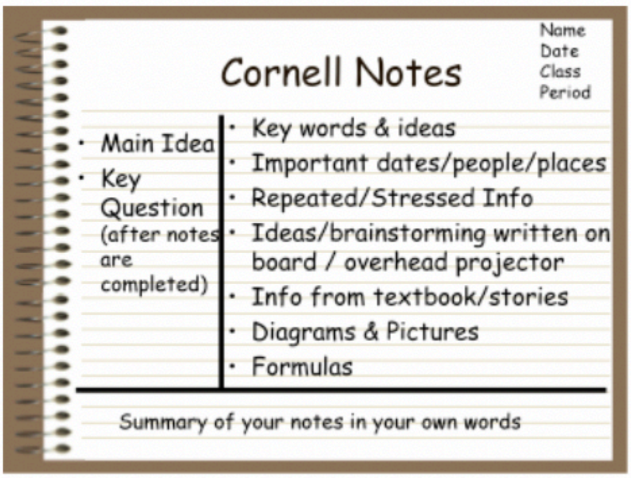
- D.3.2 Check your students' video comprehension by having them **complete a Google Form**
  D.3.2 Έλεγξε αν οι μαθητές σου έχουν κατανοήσει το βίντεο ζητώντας τους να **συμπληρώσουν ένα Google Form**.

- D.3.3 You can **embed within the text customizable questions, quizzes, notes, and media** for students to engage in as they read them online.
  D.3.3 **Μπορείς να ενσωματώσεις μέσα στα κείμενα που δίνεις προσαρμοσμένα ερωτήματα, κουίζ, σημειώσεις και άλλο πολυμεσικό υλικό** ούτως ώστε να προωθήσεις την άμεση εμπλοκή τους στη διαδικασία ανάγνωσης/μάθησης.

D.4 Notetaking/Παίρνοντας σημειώσεις

- D.4.1 You can use the **method of note taking called "WSQ** (watch-summarize-question)," created by California math teacher Crystal Kirch (http://flipping-withkirch.blogspot.com). Then students use their notes in small groups to discuss the video in class. Students who did not watch the video at home watch it in class during the WSQ small-group discussion.
  D.4.1 Μπορείς να χρησιμοποιήσεις τη μέθοδο σημειώσεις 'ΠΠΕ- Παρακολούθηση-περίληψη-ερώτηση), που δημιουργήθηκε από μία εκπαιδευτικό στην Καλιφόρνια (Crystal Kirch-http://flipping-withkirch.blogspot.com). Οι μαθητές χρησιμοποιούν αυτές τις σημειώσεις για να συζητήσουν σε μικρές ομάδες στηβν τάξη το βίντεο. Οι μαθητές που δεν παρακολούθησαν το βίντεο στο σπίτι, μπορούν να το παρακολουθήσουν στην τάξη κατά τη διάρκεια των ΠΠΕ συζητήσεων στις μικρές ομάδες.

- **D.4.2 You can instruct them in the Cornell note-taking method**, in which they take notes, record any questions they have, and summarize their learning. Students who adopt this model of note taking typically come to class with appropriate questions that help you address their misconceptions. You can also use these questions to evaluate the effectiveness of our videos. If every student has a similar question, you clearly did not teach that topic well, and you make a note to remake or correct that particular video.
  D.4.2 Μπορείτε να τους διδάξετε τη μέθοδο καταγραφής σημειώσεων Cornell, για να παίρνουν σημειώσεις, να καταγράφουν ερωτήσεις που έχουν και να κάνουν περίληψη των όσων μαθαίνουν. Οι μαθητές που υιοθετούν αυτό το μοντέλο καταγραφής σημειώσεων, τυπικά έρχονται στην τάξη με τις κατάλληλες ερωτήσεις που βοηθούν για αντιμετώπιση και επίλυση των λανθασμένων αντιλήψεων ή παρανοήσεων. Μπορείς επίσης να χρησιμοποιήσεις αυτές τις ερωτήσεις για να αξιολογήσεις την αποτελεσματικότητα των βίντεο σου. Αν κάθε μαθητής έχει παρόμοια ερώτηση, τότε ξεκάθαρα δεν έχεις διδάξει το θέμα πολύ καλά, σημειώνοντας ότι πρέπει να ξανακάνεις το συγκεκριμένο βίντεο ή να το διορθώσεις.



D.5 Δραστηριότητες στην τάξη/ Activities in class

After the initial lecture, the remainder of the class time should be utilized for IBL activities. The IB-FC practicing framework 'tasks' gives a lot of ideas on the kind of activities your students can work on as well as the kind of software they can use. Make sure though of the following:

- Students can interact and rotate rolls (e.g. as writer and helper)
- Having students actually get out of their seats and interact with each other also proves to be powerful. You can even ask them to write on the classroom windows with white-board markers. Students always enjoy the novelty of this approach.
- During class a polling system can be used to tabulate individual student responses to multiple-choice questions. You can use clickers or any kind of software which connects to your students' devices.
- Set up stations within your classroom for IBL activities. You can also place the smart whiteboard in one of the stations so that students can use it.

Μετά τη 'διάλεξη' στην αρχή του μαθήματος, ο υπόλοιπος χρόνος του μαθήματος πρέπει να χρησιμοποιηθεί για δραστηριότητες διερευνητικής μάθησης. Το πρακτικό πλαίσιο 'εργασίες' περιλαμβάνει αρκετές ιδέες για το είδος των δραστηριοτήτων στις οποίες μπορούν να εργαστούν οι μαθητές σου αλλά και το είδος των λογισμικών που μπορούν να χρησιμοποιήσουν. Βεβαιώσου όμως για τα ακόλουθα:

- Οι μαθητές μπορούν να αλληλεπιδρούν και να ανταλλάσουν ρόλους (π.χ. ως συγγραφείς, βοηθοί).
- Όταν ενθαρρύνεις τους μαθητές να σηκώνονται από τη θέση τους και να αλληλεπιδρούν μεταξύ τους είναι επίσης πολύ σημαντικό. Μπορείς ακόμα και να τους ζητήσεις να γράφουν πάνω στα τζάμια της τάξης με μαρκαδόρους ασπροπίνακα. Οι μαθητές πάντα απολαμβάνουν αυτή την καινοτόμο προσέγγιση.
- Κατά τη διάρκεια του μαθήματος μπορεί να χρησιμοποιηθεί ένα σύστημα 'ψηφοφορίας' για να συλλέξεις απαντήσεις μαθητών σε ερωτήσεις πολλαπλής επιλογής. Μπορείς να χρησιμοποιήσεις συσκευές τηλεψηφοφορίας (clickers) ή οποιοδήποτε πρόγραμμα που μπορεί να ενωθεί με τις συσκευές των μαθητών .
- Δημιούργησε σταθμούς με δραστηριότητες διερευνητικής μάθησης στην τάξη. Μπορείς επίσης να τοποθετήσεις το διαδραστικό πίνακα ως έναν από τους σταθμούς και να τον χρησιμοποιούν οι μαθητές.

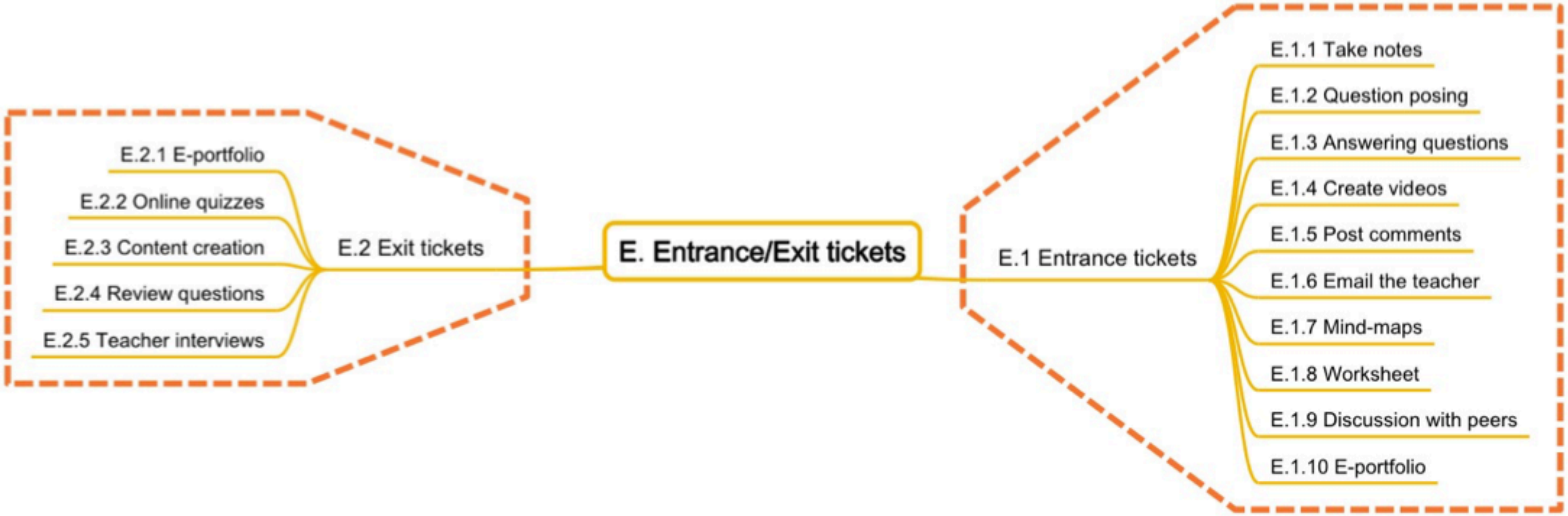
D.6 Other orchestration routines and tips/ **Άλλες ρουτίνες ενορχήστρωσης και σημαντικές πληροφορίες.**

- **D.6.1 Give extra time and/or advance notice**. Don't assign a video on one night and expect all students will complete the homework. Students may need earlier notice. Some students are over-programmed and are on the go from the moment school ends. Trying to get some time in front of an internet-connected-device at the last minute may be a challenge for some students.
  D.6.1 Δώσε αν γίνεται επιπλέον χρόνο ή προειδοποίηση στους μαθητές σου. Απέφυγε να αναθέσεις κάποιο βίντεο για παρακολούθηση με προθεσμία μία μόνο μέρα γιατί μπορεί να μην το δουν όλοι οπόταν και να μην κάνουν τις εργασίες που πρέπει. Οι μαθητές χρειάζονται συνήθως προειδοποίηση. Κάποιοι μαθητές έχουν γεμάτο πρόγραμμα το απόγευμα και μπορεί να μην αφιερώσουν τον απαραίτητο χρόνο, ειδικά αν έχουν θέματα σύνδεσης στο σπίτι.

- **D.6.2 Allow some Choice**. Not every student needs to watch every video. The key is not that they watched something, but rather that they learned something. For example, if there is an online game that teaches the same lesson, give students the choice to interact with that instead of watching a tutorial. It's your choice if you will give your students a choice, if you consider it necessary.
  D.6.2 Δώσε επιλογές. Μπορεί να μη χρειάζεται να δουν όλοι οι μαθητές το βίντεο. Το σημαντικό δεν είναι να το παρακολουθήσουν αλλά να μάθουν. Για παράδειγμα, μπορείτε να δώσετε ένα διαδικτυακό παιχνίδι που να διδάσκει ακριβώς το ίδιο πράγμα. Άρα οι μαθητές μπορούν να μάθουν μέσα από την ενασχόληση με αυτό και όχι από την παρακολούθηση του βίντεο. Είναι δική σας η απόφαση το τι επιλογές θα τους δώσετε, αν κρίνετε απαραίτητο να τους δώσετε.

- **D.6.3 Create a video for each learning goal** and not a long one for everything.
  D.6.3 Δημιουργήστε ένα βίντεο για κάθε μαθησιακό στόχο και όχι ένα πολύ μεγάλο για όλα.

- **D.6.4 Organize your week for rewatching a video**, like the example in the figure below.:
  D.6.4 Οργάνωσε την εβδομάδα σου δίνοντας επιλογές για να παρακολουθήσουν ξανά κάποιο βίντεο, όπως το πιο κάτω παράδειγμα.:


E. Entrance/Exit tickets
E.2 Exit tickets
E.2.1 E-portfolio
E.2.2 Online quizzes
E.2.3 Content creation
E.2.4 Review questions
E.2.5 Teacher interviews
E.1 Entrance tickets
E.1.1 Take notes
E.1.2 Question posing
E.1.3 Answering questions
E.1.4 Create videos
E.1.5 Post comments
E.1.6 Email the teacher
E.1.7 Mind-maps
E.1.8 Worksheet
E.1.9 Discussion with peers
E.1.10 E-portfolio

E. IB-FC Entrance and exit tickets/Δελτία εισόδου και εξόδου

E.1 Entrance tickets/ Δελτία εισόδου

Plan how you will check to see if the students have watched the video or have understood the content. Here are some suggestions.
Πρέπει να είστε σε θέση να ελέγξετε αν οι μαθητές έχουν παρακολουθήσει τα βίντεο ή έχουν κατανοήσει το περιεχόμενο. Εδώ είναι κάποιες εισηγήσεις.

E.1.1 Take notes: Ask your students to take notes whilst watching the video. E.g. You can train them to use Cornell note-taking (explained in orchestration routines) and use the questions they note down for evaluation and discussion. They can post the notes on a Moodle forum or email them to you or their peers or upload on a Drive. They can also use them the next day for discussion in small groups or for answering questions for their peers.
Ε.1.1 Να πάρουν σημειώσεις: Ζητά από τους μαθητές να παίρνουν σημειώσεις καθώς παρακολουθούν τα βίντεο. Π.χ. Μπορείς να τους μυήσεις στη μέθοδο καταγραφής σημειώσεων Cornel (όπως έχει αναλυθεί στις ρουτίνες ενορχήστρωσης) και να χρησιμοποιήσεις τα ερωτήματα που θα καταγράψουν για αξιολόγηση ή συζήτηση. Μπορούν να αναρτήσουν τις σημειώσεις σε ένα φόρουμ στο Moodle, να τις στείλουν με ηλεκτρονικό ταχυδρομείο σε σας ή στους συμμαθητές τους, ή να τις ανεβάσουν σε ένα Drive. Μπορούν επίσης να χρησιμοποιήσουν τις σημειώσεις για συζήτηση την επόμενη μέρα σε μικρές ομάδες ή για να απαντήσουν ερωτήματα των συμμαθητών τους.

E.1.2 Question posing: Ask students to write down questions about the video and maybe create a form for their peers.
Ε.1.2. Καταγραφή ερωτήσεων: Ζήτα από τους μαθητές σου να καταγράψουν ερωτήματα που προκύπτουν από την παρακολούθηση του βίντεο και ίσως να τους ζητήσεις να δημιουργήσουν και μια σχετική φόρμα για τους συμμαθητές τους.

E.1.3 Answering questions: Ask students to answer questions, either embedded within the video, in a Moodle forum, on a quiz/form e.g. Google form or a worksheet.
Ε.1.3. Απάντηση ερωτήσεων: Ζήτα από τους μαθητές σου να απαντήσουν ερωτήσεις, είτε αυτές βρίσκονται εντός του βίντεο, είτε σε ένα φόρουμ στο Moodle, είτε ως κουίζ ή φόρμα, π.χ. Google Form, ή σε ένα φύλλο εργασίας.

E.1.4 Ask students to create their own videos, e.g. EduCreations in relation to the video they have watched, or the material given to them for study. They can talk about it or record (screencasting) their steps on how they have worked towards answering relevant 'pre-class' questions.
Ε.1.4 Ζήτα από τους μαθητές να δημιουργήσουν τα δικά τους βίντεο σε σχέση με το περιεχόμενο του βίντεο ή του υλικού που δόθηκε για μελέτη. Μπορούν απλά να μιλήσουν για το τι είδαν ή να καταγράψουν (καταγραφή οθόνης) τα βήματά τους για το πώς εργάστηκαν για να επιλύσουν σχετικά 'πριν-το-μάθημα' ερωτήματα.

E.1.5 Post comments in a blog, e.g. class blog on Blogger or a content related blog.
E.1.5 Δημοσίευση σχολίων σε ιστολόγιο/μπλοκ, π.χ. στο ιστολόγιο της τάξης στο Blogger ή σε άλλο σχετικό ιστολόγιο.

E.1.6. Email the teacher (show their notes and ask an interesting questions etc.)
E.1.6 Ηλεκτρονικό μήνυμα στο δάσκαλο (με τις σημειώσεις που πήραν, υποβάλλοντας μία ενδιαφέρουσα ερώτηση κλπ).

E.1.7 Mind-map creation: Ask your students to create a mind-map with the important concepts arising from the study of the material and the video.
E.1.7. Ιδεόγραμμα: Ζήτα από τους μαθητές σου να δημιουργήσουν ένα ιδεόγραμμα με τις βασικές έννοιες/κύριες παραμέτρους που προκύπτουν από τη μελέτη του υλικού και την παρακολούθηση του βίντεο.

E.1.8 Worksheet: Ask them to complete a worksheet which will show their comprehension of the video and the material studied.
E.1.8. Φύλλο εργασίας: Ζήτα τους να συμπληρώσουν ένα φύλλο εργασίας που θα αποδεικνύει το επίπεδο κατανόησης του υλικού που είχαν να μελετήσουν ή του βίντεο που έπρεπε να παρακολουθήσουν.

E.1.9 Discussion: Ask them to discuss the video with their peers (probably in groups) prior to entering the classroom on a Moodle forum or classroom blog. You can choose to guide the discussion (pre-set questions, e.g. on the forum or within the video) or let them start-off their own discussion choosing their own theme related to the video.
E.1.9. Συζήτηση: Ζήτα τους να συζητήσουν το βίντεο με τους συμμαθητές τους (ίσως σε ομάδες) πριν το μάθημα στην τάξη αξιοποιώντας ένα φόρουμ στο Moodle ή το ιστολόγιο της τάξης. Μπορείς να καθοδηγείς τη συζήτηση (ερωτήματα καθορισμένα από πριν, π.χ. στο φόρουμ ή μέσα στο βίντεο) ή να τους αφήσεις ελεύθερους να αποφασίσουν το θέμα σε σχέση με το βίντεο.

E.1.10 E-portfolio: Ask them to note in their e-portfolio 'prior-knowledge' (what they know about the topic) before watching the video and write up their 'learning goals' (what they would like to learn about more) and 'strategies' (how they would like to work towards accomplishing the goals) after watching the video or studying the given material.
E.1.10 Ηλεκτρονικός φάκελος επιτευγμάτων: Ζήτα από τους μαθητές σου να καταγράφουν στον ηλεκτρονικό φάκελο επιτευγμάτων την 'προηγούμενη γνώση' (τι ήδη γνωρίζουν για το θέμα) πριν να παρακολουθήσουν το βίντεο και να καταγράψουν τους 'μαθησιακού στόχους' (τι θα ήθελαν να μάθουν περισσότερο) και στρατηγικές (πώς θα ήθελαν να εργαστούν για να πετύχουν τους στόχους) μετά την παρακολούθηση του βίντεο ή τη μελέτη του υλικού.

E.2 Exit tickets/Δελτία εξόδου

You can check your students understanding after the IBL activities in class through the use of exit tickets before going back to your final lecture. You can set up a passing grade level or not. Some of your options are the following:

Μπορείς να αξιολογήσεις το επίπεδο κατανόησης των μαθητών σου μετά από τις δραστηριότητες διερευνητικής μάθησης μέσα από τα δελτία εξόδου, πριν προχωρήσεις στο κλείσιμο του μαθήματος. Μπορείς να καθορίσεις και ποσοστό επιτυχίας ή όχι. Κάποιες από τις επιλογές που έχετε είναι οι εξής:

E.2.1 E-portfolio: Ask your students to create their final self-evaluation and post relevant evidence (e.g. links to their work) in their e-portfolio.

E.2.1 Ηλετρονικός φάκελος επιτευγμάτων: Ζήτα από τους μαθητές σου να καταγράψουν την τελική τους αυτοαξιολόγηση, τεμκηριώνοντας με παραδείγματα εργασιών τους (π.χ. σύνδεσμους).

E.2.2 Online quizzes: test their knowledge through an online quiz on Moodle or any other software. The final score will determine a re-sit or more direct instruction and guidance to those particular students.

E.2.2 Διαδικτυακά κουίζ: Έλεγξε τις γνώσεις των μαθητών μέσα από μικρές αξιολογήσεις είτε στο Moodle είτε σε άλλα προγράμματα. Ο βαθμός τους θα καθορίσει αν θα το ξανακάνουν ή αν θα ακολουθήσει περισσότερη καθοδήγηση και άμεση διδασκαλία σε αυτούς τους μαθητές.

E.2.3 Content creation by the students: Students can create their multimedia and be assessed on the content and knowledge level and understanding through the use of rubrics, e.g. Power Point presentatons, videos, blogs etc.

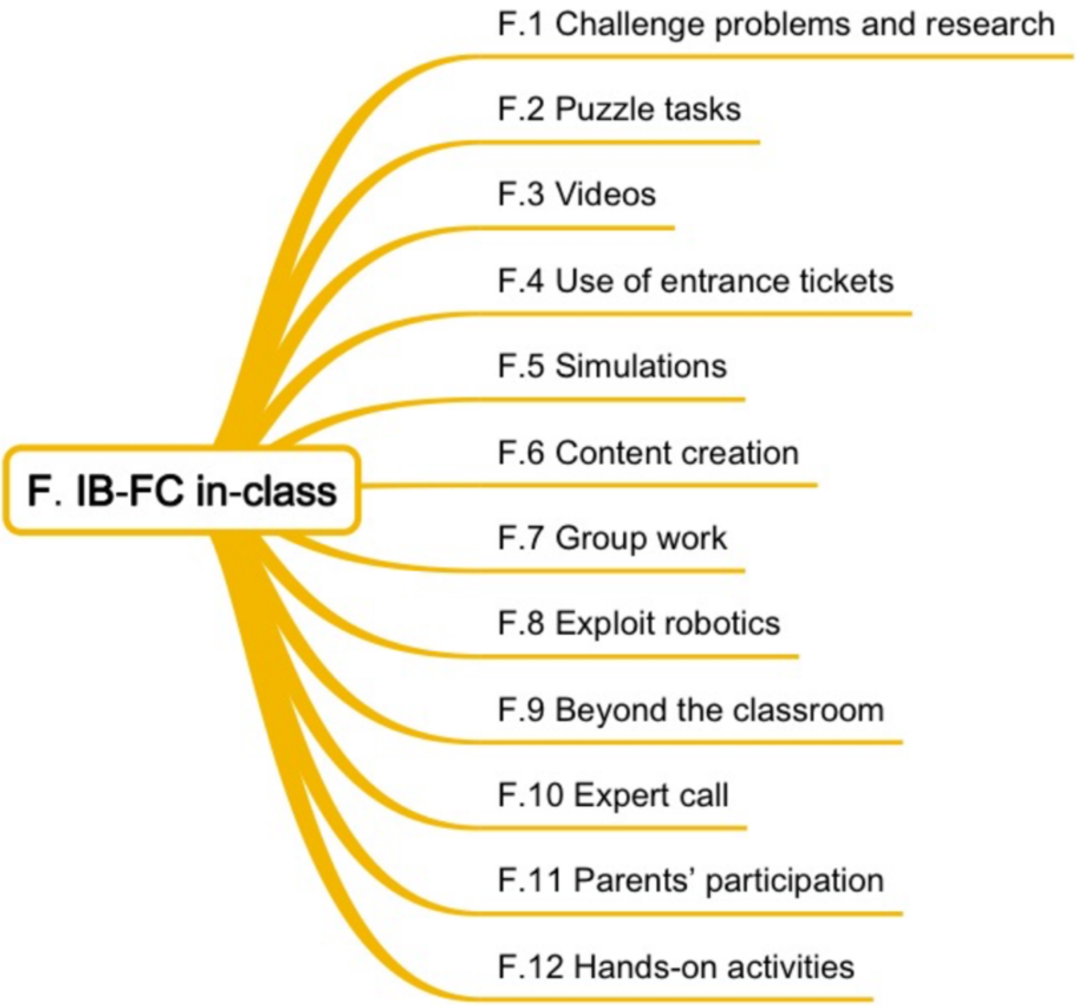
E.2.3 Δημιουργία περιεχομένου από τους μαθητές: Οι μαθητές μπορούν να δημιουργήσουν το δικό τους πολυμεσικό υλικό (π.χ. παρουσιάσεις Power Point, βίντεο, ιστολόγια κλπ.) και να αξιολογηθούν στο περιεχόμενο ή στο επίπεδο γνώσης και κατανόησης, ειδικά μέσα από κριτήρια/ρούμπρικες.

E.2.4 Review questions: Give your students questions to answer which serve as overall review questions.

E.2.4 Ερωτήσεις επανάληψης: Δώσε στους μαθητές σου να απαντήσουν επαναληπτικά ερωτήματα ολόκληρης της ενότητας.

E.2.5. Teacher interviews: Interview your students and assess their level of understanding through a discussion on particular main concepts of the chapter.

E.2.5 Συνέντευξη με το δάσκαλο: Πάρε συνεντεύξεις από τους μαθητές σου και αξιολόγησε το επίπεδο κατανόησης μέσα από συζήτηση των βασικών εννοιών και παραμέτρων του κεφαλαίου.


F. IB-FC in-class
F.1 Challenge problems and research
F.2 Puzzle tasks
F.3 Videos
F.4 Use of entrance tickets
F.5 Simulations
F.6 Content creation
F.7 Group work
F.8 Exploit robotics
F.9 Beyond the classroom
F.10 Expert call
F.11 Parents' participation
F.12 Hands-on activities

F. IB-FC in-class tasks (Inquiry-Based Learning)- Εργασίες στην τάξη (Διερευνητική Μάθηση)

After the initial lecture and the review of content at home, students will be engaged in classroom IBL tasks, with the teacher guidance. **Please refer to the research framework as well for the in-class activities.** Some options in more detail are the following:
Μετά την αρχική διάλεξη και επανάληψη του περιεχομένου που είχαν στο σπίτι, οι μαθητές θα εργαστούν σε δραστηριότητες διερευνητικής μάθησης με την καθοδήγηση του δασκάλου. **Παρακαλώ όπως έχετε ως πλαίσιο αναφοράς το πιο κάτω πλαίσιο της έρευνας ως προς τις δραστηριότητες μέσα στην τάξη**. Κάποιες από τις επιλογές σε δραστηριότητες είναι οι εξής:

- **F.1 Challenge problems and research**: Give students problems which will challenge both themselves and the knowledge obtained from the video and content studied at home. These should be able to guide learning towards research, e.g. online research and critical analysis. Exploit Moodle features such as forums, wikis, projects etc. or any other online collaborative (e.g. Socrative, Wikispaces) and research software (e.g. Surveymonkey).
  F.1 Ενδιαφέρον προβληματισμοί και έρευνα: Δώστε στους μαθητές προβληματισμούς που θα τους προκαλέσουν το προσωπικό ενδιαφέρον αλλά θα αποτελούν και πρόκληση σε σχέση με το περιεχόμενο που είχαν να μελετήσουν στο σπίτι. Αυτοί οι προβληματισμοί πρέπει να προωθούν τη μάθηση μέσα από την έρευνα, π.χ. διαδικτυακή έρευνα και κριτική ανάλυση. Αξιοποιήστε τα εργαλεία του Moodle, π.χ. wikis, forums, projects κλπ. ή οποιοδήποτε άλλο συνεργατικό πρόγραμμα (π.χ. Socrative, Wikispaces) ή πρόγραμμα έρευνας, π.χ. Surveymonkey.

- **F.2 Puzzle tasks**: Give students tasks which will be puzzles themselves and may also serve as a puzzle towards the final classroom project, e.g. mini group tasks which will contribute towards a website development.
  F.2 Εργασίες παζλ: Δώσε στους μαθητές εργασίες που μπορεί να έχουν οι ίδιες μορφή παζλ ή να συμβάλουν προς την επίλυση ενός μεγαλύτερου παζλ ως τελικό ομαδικό έργο για το κεφάλαιο, π.χ. μικρές ομαδικές εργασίες που στο τέλος θα συμβάλουν στην δημιουργία και ολοκλήρωση μιας ιστοσελίδας για το θέμα υπό μελέτη.

- **F.3. Videos**: Students develop videos explaining not just what they did, but more importantly, how what they did led them to their conclusions in their research/experimentation etc. They can use screencasting or any other method/scenario.
  F.3 Βίντεο: Οι μαθητές αναπτύσσουν τα δικά τους βίντεο, εξηγώντας όχι μόνο το τι έκαναν, αλλά κυρίως το πώς οι ενέργειές τους τους οδήγησαν σε συγκεκριμένα συμπεράσματα στην έρευνά τους ή στους πειραματισμούς τους κλπ. Μπορούν να κάνουν καταγραφή οθόνης ή να ακολουθήσουν όποια μεθοδολογία/σενάριο θέλουν στο βίντεό τους.

- **F.4 Use of entrance tickets**: The teacher can choose one of the student books/work/notes/entrance tickets to put into a word cloud (e.g. www.wordle.net) and lead the discussion onwards and towards IBL activities.
  F.4 Αξιοποίηση των δελτίων εισόδου: Ο δάσκαλος μπορεί να επιλέξει την εργασία κάποιου μαθητή, π.χ. τις σημειώσεις του/το δελτίο εισόδου, και να φτιάξει ένα λεξοσύννεφο με αυτό (e.g. www.wordle.net). Αυτό θα καθοδηγήσει τη συζήτηση και τις περαιτέρω εργασίες διερεύνησης.

- **F.5 Use simulations**: You can demonstrate something to students using simulations, so you can trigger further research or let the students explore them themselves and create a report on a relevant topic.
  F.5 Χρησιμοποίησε προσομοιώσεις: Μπορείς να δείξεις κάτι στους μαθητές χρησιμοποιώντας προσομοιώσεις ως αφετηρία περαιτέρω διερεύνησης ή να αφήσεις τους μαθητές σου να εξερευνήσουν από μόνοι τους την προσομοίωση και να αναπτύξουν μία έκθεση αναφοράς σε ίδιο ή παρόμοιο θέμα.

- **F.6 Create their own content**: Let the students be creative and ask them to create particular content on a topic they have researched and worked on or let them choose the means and nature of their creation. They can choose to use any kind of software or application, rather than giving it to them yourself, and develop websites, blogs, games, comics, interactive posters, tutorials, simulations, presentations, videos, radio shows, newsletters etc.
  F.6 Δημιουργία δικού τους περιεχομένου: Άσε τους μαθητές σου να είναι δημιουργικοί. Ζήτα τους να δημιουργήσουν περιεχόμενο για ένα θέμα που έχουν ερευνήσει πρώτα ή έχουν εργαστεί με άλλον τρόπο πάνω σε αυτό. Μπορείς να τους αφήσεις και ελεύθερος να αποφασίσουν τη μορφή του περιεχομένου τους και τον τρόπο που θα το αναπτύξουν. Μπορούν να επιλέξουν οποιαδήποτε εφαρμογή ή πρόγραμμα παρά να τους δώσετε εσείς προκαθορισμένα, οπόταν μπορούν να αναπτύξουν ιστοσελίδες, μπλοκ, παιχνίδια, κόμικ, διαδραστικές αφίσες, διδασκαλίες, προσομοιώσεις, παρουσιάσεις, βίντεο, προγράμματα τηλεόρασης, ενημερωτικά δελτία κλπ.

- F.7 **Group work**: Ask the students to work in groups using various online collaborative software, e.g. wikis, shared documents, Google suit applications etc., so they can co-write, self and peer-assess more easily.
  F.7 Συνεργατική δουλειά: Ζήτα από τους μαθητές να εργαστούν ομαδικά χρησιμοποιώντας ποικίλα συνεργατικά εργαλεία, π.χ. wikis, αρχεία διαμοιρασμού, εφαρμογές σουίτας της Google κλπ., ούτως ώστε να μπορούν να γράφουν συνεργατικά, να κάνουν πιο εύκολα αυτό- και ετεροαξιολόγηση.

- F.8 **Exploit robotics**: Use applications and specialized software which will challenge them into 'writing code' and using robotics for practicing and understanding basic concepts or even developing an app or a game on the topic they have worked on, e.g. Robomind, Scratch, Minecraft etc.
  F.8 Αξιοποίηση της ρομποτικής: Χρησιμοποίησε εφαρμογές ή εξειδικευμένα προγράμματα ρομποτικής που θα τους προκαλέσουν το ενδιαφέρουν αφού θα 'γράψουν κώδικα' και θα κάνουν εξάσκηση για κατανόηση βασικών εννοιών ή ακόμα

θα αναπτύξουν οι ίδιοι μια εφαρμογή ή ένα παιχνίδι πάνω στο θέμα που εργάζονται, π.χ. Robomind, Scratch, Minecraft κλπ.

- **F.9 Beyond the classroom**: Promote student collaborations beyond the classroom with other teachers/students within the same school or other schools nationwide or internationally. Use online communities, such as the Microsoft in Education community https://education.microsoft.com to connect your students and let them work on a project together through the use of Moodle or the Microsoft suite. Furthermore, promote collaboration with local authorities and other stakeholders.
  F.9 Εκτός των ορίων της τάξης: Προώθησε τις συνεργασίες των μαθητών σου πέρα από τα πλαίσια της τάξης, με άλλους δασκάλους/μαθητές στο ίδιο σχολείο ή με άλλα σχολεία παγκύπρια ή διεθνώς. Αξιοποίησε διαδικτυακές κοινότητες μάθησης και συνεργασίας, όπως το the Microsoft in Education community https://education.microsoft.com για να συνδέσεις τους μαθητές σου και να τους δώσεις ευκαιρίες να εργαστούν με άλλους μαθητές πάνω σε ένα έργο είτε μέσω Moodle ή μέσω των εργαλείων της σουίτας της Microsoft. Επιπρόσθετα, προώθησε τη συνεργασία με τις τοπικές αρχές ή άλλους εμπλεκόμενους ανάλογα με το θέμα.

- **F.10 Expert call**: Use experts on the topic you work on worldwide to connect with, e.g. via Skype in the classroom.
  F.10 Επικοινωνία με ειδικούς: Αξιοποιήστε την εμπειρία ειδικών στο θέμα που μελετάτε διαρκώς μέσω π.χ. τηλεδιασκέψεων Skype in the classroom.

- **F.11 Parents' participation**: Invite parents to come to class and work along with their children. This will be especially useful if the parents watch the videos with their children. It will also give parents a chance to see how you are working in class and learn how to guide their students at home (e.g. whilst watching the videos and studying the material or help them take a step further through the research of the relevant field).
  F.11 Συμμετοχή γονέων: Προσκαλέστε τους γονείς να έρθουν στην τάξη και να εργαστούν με τα παιδιά τους. Αυτό θα είναι ιδιαίτερα χρήσιμο αν οι γονείς παρακολουθούν κι αυτοί τα βίντεο που ανατίθενται στο σπίτι. Θα δώσει επίσης στους γονείς την ευκαιρία να δουν τον τρόπο που εργάζεστε στην τάξη και να μάθουν καλύτερα το πώς να βοηθούν τα παιδιά τους στο σπίτι (π.χ. καθώς παρακολουθούν τα βίντεο και μελετούν το υλικό ή το πώς να τους βοηθήσου να παν ένα βήμα παρά πέρα προς τη διερεύνηση του θέματος υπό μελέτη.

- **F.12 Hands-on activities**: Promote hands-on activities with your students which are an extension and application of the content studied by the students.
  F.12 Πρακτική εφαρμογή: Προωθήστε τις δραστηριότητες πρακτικής με τους μαθητές σας οι οποίες αποτελούν εξέλιξη και εφαρμογή του περιεχομένου που έχουν μελετήσει οι μαθητές από πριν.

Appendix Three: Examples of lesson plan analysis-Screenshots

Case Study 1:

Lesson	Attracting Students' interest	Flip	Entrance ticket	In-class IBL	After-class	Assessment	Moodle	Other Digital tools	Orchestration
CS1: Greek – Trash (Virtual Reality Lesson)	Introductory video	Teacher flip (Screencast-o-matic) & online link	Question answering	-Information analysis -Use of uploaded link (write a paragraph in ex. Book) -Google Expeditions -Letter writing for the mayor -Leaflet creation	-Further information videos -Fun video for reward	Formative -Formal teacher assessment of written assignments	Content upload	-Google Expeditions	Moodle design
CS1- Greek (Weather)	Introductory video - discussion	Online article	Write up of adjectives (Moodle wikis) -Moodle forum (Question answering)	-WebQuest: Use of online links on Moolde -Moodle forum (discussion of impressive articles) -Create your own article on Voki- weather cast	Newspaper creation	-Formative -Formal/final teacher assessment of written assignments and voki	-Moodle forum (entrance ticket-note-taking/question answering/in-class discussion) -	-Voki	Step-by-step research guidance (all links given to the students)
CS1- Greek (1^{st} October national celebration)	Introductory YouTube video	Youtube video	Answer questions in exercise book or in the Moodle forum	-WebQuest: Use of Google slides -Avatar creation on Voki (Google docs -write up of article)	Enjoy the 'Freedom' video	Formative -Formal/final teacher assessment of written assignments and Voki	Forum (entrance ticket)	-Google Slides -Voki	Moodle design
CS1- Greek- Beach garbage	Relevant introductory article	Online article	Answer questions in Moodle forum	Additional online articles (enrich your initial answers in the forum) -Additional video -Students prepare an informative leaflet - Argumentative writing	Video on turtle rescue	-Formative -Formal: Rubrics (teacher assessment)	Forum (entrance ticket)		Moodle design (embedded content)
CS1- Maths- Place value	Online presentation	Online YouTube video	Book activities	-Math Games 3^{rd} (Mini Games)- tablet application -Book activities	Additional video	-Online (application) -Whole class (book activities)		-Application: Math Games 3^{rd} (Mini Games)	
CS1- Maths- Subtraction (3 digit numbers)	Link to previous lesson	Two online YouTube videos	Activity worksheet	-Videotutorial (Youtube) -Book IBL activity	Drill & Practice Math activities	Teacher assessment			
CS1- Multiplication (single digit factor with a two digit factor)		Youtube videos	Activities in the Maths exercise book	IBL activity in Math book	Further Math book activities	Math online game		MrNussbaum (online Math games)	Use of textbook
CS1-Maths- Shapes symmetry		Online presentation	Online quiz	-Creation of a Kahoot quiz -Online research: a drawing of symmetry	Video with symmetry scenery	-Formative -Whole class assessment -Online (quiz)		Kahoot	Online quiz

Case Study 2:

Lesson	Attracting Students' interest	Flip	Entrance ticket	In-class IBL	After-class	Assessment	Moodle	Other Digital tools	Orchestration
CS2- Greek- Right to education	Online videos	Online YouTube videos	Moodle forum (question on videos)	-Discussion and further online research	Additional video	Teacher assessment	Forum (entrance ticket)		
CS2- Greek – Disabled children	New text discussion	Story telling video (Youtube)	Write your own poem (Moodle forum)	-Online research- chat discussion	Extra informative video (YouTube)	Forum	Forum (entrance ticket) Chat (discussion in class)		Chat
CS2- Greek- Christmas	Christmas discussion	Story-telling (YouTube- Christmas story)	Moodle forum (Answer the flip question)	Moodle chat (on content of tale)		Chat discussion (teacher assessment)	Forum (entrance ticket) Chat (discussion in class)		Chat
CS2- Greek- verb endings	Grammar analysis	Teacher's video & Youtube video	Moodle forum (write up sentences)	Grammatical IBL activities	Verb game	Formative Final teacher	Forum (entrance ticket)	Screencast-o-Matic	Moodle design

Case Study 3:

Lesson	Attracting Students' interest	Flip	Entrance ticket	In-class IBL	After-class	Assessment	Moodle	Other Digital tools	Orchestration
CS3-Greek- Real estate adverts	Text in Greek book	Online content on Moodle	Activities in Greek exercise book	Advert writing	Correction of adverts	Formative Rubric for the adverts	Content upload		Moodle design
CS3- Greek Grammar (sentences)	Revision of previous lesson	Youtube videos	No entrance ticket	Advert writing (emphasis on type of sentences)		Peer assessment	Content upload	Google Drive	Moodle design Google Drive
CS3- Greek: Essay writing		Essay plot Essay example	Thinking about it (no entrance ticket)	Essay writing	Finish off essay	Teacher assessment (rubric- plot)	Content upload		Moodle design
CS3- Greek: Nutrition	Nutrition pyramid	Fairy-tale video	Answering questions in ex. book	Creating an image of the poem in Power Point (example on Moodle)	Complete the image	Teachers assessment (rubric)	Content and example upload	Power Point	Example given
CS3-Greek- Advertisement	Introduction to advertising	Youtube advertisements (examples)	Write 5 main questions for internet safety	Write a video scenario/advert for internet safety (many Youtube examples) -Video creation	Further analysis of scenarios	Rubric	Content upload	Google Drive	Moodle design Google Drive
CS3- Greek- fairy-tales	Introduction to fairytales	Fairy tale reading- Youtube	Have a look at examples of activities	Activity creation for fairy-tales	Completion of activities	Rubric for each activity	Content upload	Software according to activity	Examples of activities
CS3- Greek- Essay writing	Introduction to the theme	Example of essay content	Create an essay diagram	Write-up of essay (description)	Final draft	Teacher assessment	Assignment upload	Google Drive	Example given Google Drive
CS3- Maths- Angles	Representatio n of angles	Presentation on Slideboom	Solve activities in the Maths' book	Use Geogebra to solve Maths' activities	Extended use of Geogebra	-Whole class assessment -Online assessment	Content upload	Slideboom Geogebra	Moodle design

CS3-Mahts-triangles		Images/presentation of types of triangles	No entrance ticket	Use Illuminations for completing Math book activities	Extra exercise on Illuminations	Online	Content share	NCTM-Illuminations	Links to guide
CS3- Maths-triangle properties	Introduction (Geogebra)	Image presentation	No entrance ticket	Geogebra-Math activities	Extra Geogebra activities	Online	Content share	Geogebra	Moodle design
CS3- Maths-polygons	Introduction (Geogebra)	Image presentation	No entrance ticket	Geogebra-Math activities	Extra Geogebra activities	Online	Content share	Geogebra	Moodle design
CS3-Maths-parallelogram	Introduction (Geogebra)	Image presentation	No entrance ticket	Geogebra-Math activities	Extra Geogebra activities	Online	Content share	Geogebra	Moodle design
CS3-Maths-Multiplying decimals	Introduction to multiplying decimals through example (images on Moodle)	Youtube video	Math book activities	Math-play online game for practice	Math book activities	Online (Math-play online game for practice)	Content share	Math-play.com	Moodle design
CS3-Geography-Earth oscillation	Image-introduction	Presentation	Online quiz on Kahoot	Youtube videos and activities on them -Kahoot creation		Online- Kahoot	Content share	Kahoot	Quiz
CS3-Geography-parallel lines		Presentation	Questions in ex. book	Revision	Note-taking	Formative	Content share		
CS3-Geography-Life of earth	Image and introductory video	Presentation	Note-taking	Argumentative writing based on the flip	Note-taking	Teacher assessment (rubric on argumentative writing)	Content share Google Drive		Moodle guide Google Drive
CS3-Geograpgy-Atmosphere	Introductory video	Presentation	Note-taking	Activities on a Word document on Moodle	Complete activities	Formative	Doc upload		Notes

Case Study 4:

Lesson	Attracting Students' interest	Flip	Entrance ticket	In-class IBL	After-class	Assessment	Moodle	Other Digital tools	Orchestration
CS4- Greek-recipes and grammar	Textbook (read and discussion)	-Youtube (recipes) -Teachers' video	Moodle forum (answer questions)	-Compare texts -Use Moodle chat -Online research	Moodle chat		Forum (entrance ticket) Chat (compare texts in class)		Moodle design
CS4-Greek-Nutrition	Nutrition in different countries	Personal student research on the subject	Note-taking	-Moodle Assignment (Description) -Online research	Peer assessment	-Peer assessment -Teacher assessment (Moodle upload)	Moodle Assignment (Description)		Moodle design
CS4-Greek-Nutrition in ancient Greece	Discussion	Website and Youtube video	Moodle quiz	Discussion on flip content and entrance ticket answers		Whole class and teacher assessment (Moodle quiz)	-Source upload -Quiz		Moodle design
CS4-Greek-Christmas	Christmas text in Greek book	Three videos on Christmas carols	First draft: description of traditional carols in Cyprus	Second draft of description (Cyprus carols- differences between the other countries)	Finalize the description	Moodle assessment (grading on Moodle)	-Moodle upload feature -Moodle assessment		Moodle design
CS4- Greek-Introduction (poetry- life in other countries)	Lesson goals identified	Youtube video: Poem narration	No entrance ticket	-Processing narration -Online debate		-Formative		Google Docs	
CS4- Greek grammar (argumentative writing)	Connection to introductory lesson	Youtube video: Argumentative sentences	Moodle quiz (connect the sentences)	-Youtube video -Moodle assignment (description)	Finalize the description	Moodle assessment (grading)	Moodle assessment (grading)		Moodle design
CS4- Greek refugees		Online interactive game	Moodle upload: descriptive writing (according to game content)	-Repeating the game -Finalize the written assignment (entrance ticket)		Moodle assessment (teacher assessment)	Moodle assignment	Taxidifygis.org.com	Moodle design

CS4- Greek literature		Video- National Geographic documentary	No entrance ticket	-Video: grammar -Grammar practice		Formative	Content upload		Moodle design
CS4- Greek refugees		Four videos on refugees (different stories)	Note taking (Greek exercise book)	-Questions in exercise book		-Grading of questions in exercise books	Content upload		
CS4- Greek (war and peace)	Moodle glossary	Youtube video	Moodle assignment (explain parameters in video)	-Youtube video -Moodle assignment (student opinions	Finalize Moodle assignment	Moodle assessment	-Glossary -Assessment -Assignment upload		Moodle design
CS4- Greek (war and peace)	Connection to previous lesson	Youtube video	Moodle quiz	-Moodle crossword -Online sources -Moodle assignment (description-upload)	Finalize Moodle assignment	Moodle assessment	-Glossary -Assessment -Assignment upload		Moodle design

Case Study 5:

Lesson	Attracting Students' interest	Flip	Entrance ticket	In-class IBL	After-class	Assessment	Moodle	Other Digital tools	Orchestration
CS5: Geography: North Africa and economic development	Introductory questions	Youtube video	Question answering in exercise book	-Online research -Mind-map creation	Preparing a pantomime game	Formative	Content upload	-MindMaple	
CS5: Science- Heat & Temperature	Moodle chat discussion	Youtube video	Worksheet completion	-Worksheets -Watch the video, execute the experiments, write-up of investigation notes	Conclusions in the Moodle forum	Self-assessment (correct answers on Moodle)	-Chat (introduction) -Forum (conclusions) -Content upload		Experiments on video as well
CS5: Greek Lang, Recipes	New short text- Reading, Discussion, Q & A	-Recipes video (YouTube) -Teacher flip 'Moods- verbs'	Moodle forum: Questions/Answers	-Comparison of sources- mind-maps -Write your own recipes in pairs (Drive)	Peer-assessment (Drive)	-Teacher assessment (Entrance ticket) -Peer-assessment (Final work)	-Forum (Q & A as entrance ticket)	-Drive -Mind-mapping software -Camtasia	Students can choose which activities to complete
CS5: Greek Language- Turkish Invasion	-YouTube video (Turkish invasion) -Discussion	2 short YouTube videos (Turkish invasion)	Moodle forum: Questions/Answers	-New text- comparison (Drive) -Online research (extra resources- game creation)	-Finish the online game creation	-Self-assessment rubric -Self-reflection on Moodle forum	-Forum (Q & A as entrance ticket) -Forum for collecting game links -Forum for students' reflections -Uploaded link of a Cyprus map	-Drive -Purpose games	Use of the Google Drive for initial online research
CS5: Greek Language- 'Flying Books'	-Lesson on Mahara platform	Teachers' video-flip (prepared on Camtasia) on	Moodle forum: Questions/Answers	-Mind-map preparation (main parameters for creating a	E-portfolio development in Mahara	-Self-assessment rubric.	- Forum (Q & A as entrance ticket) -Forum wikis: narration-group work	-Camtasia -MindMaple -Mahara	Work divided to five parts

	-Youtube video: 'Flying Books'	narration techniques		narration for the silent video 'Flying books') -Group work on Moodle wikis: narration		-Reflection: in the Moodle forum			
CS5: Greek Language-Literature book 'Sebastian'	Reading part of the book, discussion and completion of short introductory activities	-Teachers' video-flip (prepared on Camtasia) on hypothetical sentences	Moodle forum: hypothetical sentences	-Drama play in class -Use of templates for game creation -E-portfolio development	Finish off the game creation and e-portfolio development	Self-reflection: answering reflection questions in Moodle forum	-Forum: entrance ticket -Forum: game links shared -Forum: reflection questions	-Camtasia -Sightwords -Jigsawplanet -Power Point -Google Drive -Mahara	Google drive
CS5: Greek language: Grammar: Indefinite articles	'Magic story'- Discussion	-Teachers' video flip (Camtasia) -Information text on Moodle	Moodle forum with activities to fill-in	Apply the new knowledge in filling-in the gaps	Extra 'Drill and Practice' activities	Formative	Forum- entrance ticket	-Camtasia	Moodle information text (explanation)
CS5: Greek Language-Grammar-punctuation signs	Link to previous lesson	Teacher's video flip (Camtasia)	Worksheet (online or in printed form)	Further practice		Formative	Information and link upload	Camtasia	Worksheet in alternative format
CS5: Greek Language-Expressions	Text: finding expressions	Teacher's video flip (Camtasia)	Book activities	-Discussion of differences between expressions (giving examples-forum) -Practice on worksheet -Online research	-Finish presentations	Formative	-Forum (discussion during IBL) -Examples upload -Music break link	-Camtasia -Google Drive for presentations	Google Drive
				(countries and expressions)- use the examples uploaded (presentation preparation)					
CS5: Greek Language-'Fairy-tales-Trivizas'	Research presentation	-Ready-made flip (Evgenios Trivizas-YouTube)	-Moodle chat: advice given within the flip -Mind-map creation	Creative work: students create activities for other students: Team work (Storyboad, Scratch, Powtoon) -Share of work/links in forums	Finish activity creation	-Rubrics/ Google Sheets -E-portfolio development	Chat: real time discussion (entrance ticket) -Forum: Upload of mindmap -Forum: links to activities created	-MindMaple - Storyboardthat -Scratch -Powtoon -Worksheet generator -Google Drive	Moodle chats and forums
CS5: Greek Language: Instructions in how to use home appliances	Revision of previous lesson- new text	Teachers' flip (Camtasia)	Note taking in exercise book	-Study of uploaded links (question answering on Moodle forum) -E-portfolio development		-Formative -Teacher comments on Moodle forums	-Forum (question answering during IBL) -Forum for any inquiries	Camtasia	Moodle upload
CS5: Internet addiction	Cartoon showing internet addiction (discussion)	-Slideshare presentation -Links to resources	Collection of relevant pictures (Google slides-presentation creation)	Relating text to the cartoon pictures -Moodle forum (note taking) -Moodle wikis (Argumentative writing)	Finish argumentative writing	Peer assessment on wikis' comments	-Moodle forum (note taking) -Moodle wikis (Argumentative writing)	-Slideshare -Google Slides	Multiple links (offering a choice to students) and in multiple formats (online and hardcopies)

CS5: Professions, Direct and Indirect Writing	Introductory video (traditional professions)	Slideshare presentation	Moodle forum (direct and indirect writing)	-Group work: Moodle forum (talk about traditional and contemporary professions) -Moodle chat (discussion- their own future choice) -Journalism: prepare and carry out an interview -Publish on classroom blog -E-portfolio development	-Interview transcription on Google docs - E-portfolio development	Peer-assessment after transcription (approval by interviewees)	-Moodle forum (entrance ticket, discussion, direct and indirect writing) -Moodle chat (during IBL)	Google docs	Step-by-step procedure on Moodle (all activities in forum threads)
CS5- Maths- Fractions	Introductory exercises	Youtube video- equal fractions	Create your own tutorial using Screencast-o-matic	Corrections on the tutorial	Use of tutorial for further book activities	Whole-class assessment	Upload of material	Screencast-o-matic	Video tutorial in how to use the software
CS5- Maths- addition and subtraction in Maths	Introductory YouTube video (addition and subtraction)	YouTube video (addition and subtraction)	Moodle forum (individual threads): writing up their own addition/subtraction problems using fractions	Peer-assessment of problems in forum	Correction of problems	Peer and whole class assessment	Forum (entrance ticket)- problem writing		Individual threads in forum
CS5- Maths- Trigonometry	Presentation of shapes in Geogrebra	Teacher's flip (Camtasia) (properties of shapes)	Use of Geogebra to create some shapes	Use Geogebra to complete Math's activities online and in the book	Use of extra online support for further activities	Self-assessment (correct answers on Moodle)	Forum for inquiries	-Geogebra -Camtasia	Forum for inquiries
CS5- Maths- ratios	No introduction	Teacher's flip (Camtasia)	Moodle forum: answer questions on the video (separate threads)	Further activities on ratios	Further Drill & Practice activities	Whole class assessment	Forum- entrance ticket		Google Drive
CS5- Maths- ratios	Revision of last lesson	YouTube video	Use of online tools for practice	Further activities on ratios	Further Drill & Practice activities	Whole class assessment	-Material upload -Forum (inquiries)	-Softschools	Moodle forum- inquires

CS5- Maths (decimal places- subtraction)	Introductory activities (decimal places)	Teacher's flip (Playposit)	Answer the questions popping- up the flip	Further activities on subtraction of decimals (use of textbook)	Further Drill & Practice activities	Whole class assessment	-Material upload	-Playposit	Questions within the flips
CS5- Maths- revision	Revision activities	Teacher's flip (Camtasia)	Assessment on the flip (Moodle forum)	-Moodle quiz (on the flip content) - Chat discussion	Further Drill & Practice activities	Self-assessment (forum)	-Forum: Inquiries/assessment of flips -Moodle quiz -Group chat	-Drive	Moodle forum- inquires
CS5- Maths- multiplication in fractions	Introductory Math activities	Youtube video	-Moodle forum: preparation for interviews -Personal student interviews (what they have understood from the flip) in class with the teacher	Game creation on Purpose Games (Moodle forum: preparation and share of game's link)	Further Drill & Practice activities	Self-assessment: Playing the game	-Forum (note-taking/interview preparation) -Forum (note taking for game creation, link share)	-Purpose Games	Forum for note-taking and share of links
CS5- Maths- Division in fractions	Practical examples of fraction division	Youtube video of fraction divisions (algorithm)	1st day: Students create a representation of a fraction division equation (upload on forum) 2nd day: Peer assessment on the representations created (same forum)	Dialogue creation about the way of solving division equations in fractions in Toontastic	Online Drill & Practice games on Moodle	-Peer-assessment in forum	-Forum (entrance ticket, peer-assessment) -Games' upload	-Toontastic	
CS5- Maths- multiplication and division in fractions	Online links for algorithm reminder	Youtube video	Practice on 'Explore Learning'	Online Drill & Practice activities on Moodle	Online Drill & Practice activities on Moodle	Formative	Content upload	-Explore Learning	

CS5- History (Rennaisance)	Introduction (History textbook)	Online guides and links (new information) & Youtube tutorial	History line preparation (Timetoast)	Answer the inquiry questions and present them in any way you want (presentation comic, video)	E-portfolio creation	Self-assessment rubric (embedded in e-portfolio page)	-Uploaded links	-Timetoast	Moodle design
CS5- History (Greek Revolution)	Introductory YouTube video	Youtube video	Create a Google Forms survey (include 10 questions according to flip content)	Answer survey questions and share with other classes		Whole class and teacher assessment	-Forum for share of survey links	-Google Forms	Moodle design

Appendix Four: Teacher Interview Protocol

Teacher Interview Protocol

A. Design of learning cycles:

1. Can you explain the route/process you have followed for designing the learning cycles?

2. In which format/form had it been easier to prepare material for the pre-class session?

3. Which format of the 'entrance tickets' had been more effective?

4. How were the IB-FC frameworks helpful?

5. Which had been the main challenges in creating the learning designs/cycles?

6. What would you have done differently regarding the design of the learning cycles?

7. Which had been the best parts of the design process?

B. Implementation of learning cycles

8. What worked and what didn't work during implementation?

9. How was the pre-class material explained and/or communicated to the students?

10. What was the time limit given for the completion of the entrance-ticket?

11. How did you make sure that students came in prepared for the lesson?

12. How have you used the Moodle features (e.g. forums) during each stage of implementation?

13. How well were the students prepared for the in-class session every time?

14. What did you do if you realized that students hadn't been properly prepared or haven't completed the entrance ticket?

15. Which types of in-class activities had been more effective during implementation? Why?

16. How did you use the IB-FC frameworks during implementation (e.g. orchestration routines). Which changes would you suggest for each of those frameworks and why?

17. What would you have done differently in the next learning cycle, how and why?

C. Technical issues

18. Which software have you found more useful for creating the flips or the online material you gave to your students or during the in-class session for inquiry-based learning?
19. How long did it usually take to prepare the flips and the material given?
20. How was the Moodle platform useful and which had been the limitations?
21. How did you deal with device problems or problems of connectivity at home? Did you give any alternative ways to get prepared for the in-class session?

D. Assessment

22. How did you assess the pre-class session?

23. How were entrance tickets assessed?

24. How did you assess the in-class activities?

25. How did you assess the skills gained through the implementation of the process?

E. Overall Perceptions:

26. What do you think your students have personally gained from the implementation of the model?

27. What do you have personally gained from the implementation of the model?

28. Which had been the major challenges in the overall implementation of the model?

29. What do you think it should change regarding any of the stages of the design and implementation process?

Appendix Five: Student Focus Groups Protocol

Student Interview Protocol

A. Pre-class

1. Which type of the uploaded material (videos, text, online sources, presentations etc.) had been the most helpful in understanding the content and completing the entrance ticket?
2. Was it easy/hard or fun? When?
3. What was the most difficult part of your work at home?
4. Did you have any technical problems (internet connection, device) whilst working at home? How did you deal with it?
5. What did you like best whilst working at home?
6. How did you get any help/assistance when needed?
7. If you could suggest something else to be done for learning the content before going back to class, which would it be?

B. In-class

8. How was it working in class on something you had to learn well at home?
9. What happened if you haven't understood something at home or haven't completed the entrance ticket?
10. How did you distribute tasks during in-class time and why?
11. Which type of tasks/activities did you enjoy more during in-class time? Why?
12. Did you encounter any difficulties whilst in-class time? Any particular challenges?

13. If you could suggest something to be done differently in-class, what would it be?

C. Post-class

14. How did you work towards completion of the tasks/activities in class?
15. How was the teacher helpful after the in-class session? Which means of communication were available?
16. Did you have any pressure during the completion of tasks?
17. What was the best thing after the in-class session? What did you like the most about it? Which tasks did you like best?
18. What would you have preferred to be done differently?

D. Overall Perceptions

19. Which skills do you think you have developed through this new way of learning? How was it helpful to you in any way?
20. Is there anything you want to change in the way that you learn? Do you want to keep working in this way? Why yes/no?

Appendix Six: Parents' and Guardians' Survey

Parents' and Guardians' Survey

A. Teaching-learning method

1. How do you evaluate the new way of learning for your children (e.g. the use of the Moodle platform (http://www.protyposxoleio.com), the use of video-tutorials, the material given to the students before the lesson, the use of the forum discussions, the use of technology in class etc.)

2. Which do you think are the strongest points of such a teaching method at every stage?

3. Which do you think are the weakest points of such a teaching method at every stage?

4. Did your child face any difficulties during his work at home (pre and post-class)? How did he deal with it?

5. What would you prefer to have been done differently at any stage of the implementation (pre-, in- and post-class)? How and why?

____
____
____
____

B. Parent involvement

6. Which had been the challenges for you as a parent?

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____
____
____

7. In which way do you think you have contributed towards this new way of teaching? Did you like that or not?

____
____
____
____

8. Do you feel that you could have contributed in any different way (e.g. own Moodle page etc.)

____
____
____
____

9. Do you feel that there was enough support given to you by your child's teacher in helping your child at home (pre and post-class)?

____
____
____
____

C. Technical aspects

10. Did your child had any problem with his device, internet connection software, applications at home? How did you deal with it?

____
____

11. How was the use of Moodle at home? Any problems/difficulties?

D. Overall perceptions

12. Do you wish your child to keep working in this way or not?

13. Which are the skills that you have seen your child develop with this new teaching method?

14. How do you think this new way of teaching has benefited you as a parent?

15. What do you think it could be done differently so that such a teaching method would have a better benefit for your child?

Thank you for your time!

Appendix Seven: Classroom Observation Protocol

Classroom Investigation Protocol

School:

Teacher:

Date:

Time:

Learning Cycle:

Lesson:

Pre-class design- code

Parameter/Notes
Orchestration Routines: **-Opening/closing lecture, particular review questions, assessment routines (question posing, format of written assessment)** **-Support materials to students (chat rooms, online libraries, forums, presentations etc.)** **-Question posing (how/when)** **-Student notetaking (how/when)**

-Activities in class (role rotation, interaction, poll system, stations etc.) **-What if they don't watch the flip? What does the teacher do?** **-Access to videos (how)?** **-Use of entrance ticket (how is it used?)** **-In-flip (students watch the flip in class)** **-Choice boards (giving choices to students)**
Activities in Class **IBL: Inquiry-based learning OR other activities (Which in-class activities are designed for the classroom time and which are either inquiry-based or not).**
Technology (devices, internet connection, applications/software) **-Do students use the computer lab, school mobile devices or do they bring their own?** **-Is there a good internet connection? How's the WiFi connection?** **-Which apps/software are used?**
Other tools: -Which other material are used? (e.g. flashcards, worksheets, hands-on-tools)

Classroom (seating plan/arrangement, accessibility) **-Seating arrangement: Is the arrangement set or does it change according to activities? (i.e. in pairs/in groups/on their own/as a class)** **-Is there a space to gather as a class (away from devices)?**
Teacher Role: **All actions of the teacher in the different phases of the lesson (opening lecture, use of entrance ticket, inquiries administration, organizing/facilitating inquiry-based learning process, assessment process, closing lecture, classroom management, crisis management, options given, rewards etc)**
Student role: How students respond in the different phases of the lesson (opening lecture, presenting the entrance ticket, participation, communication, sharing of ideas, group management/work, internet use, creativity, process of inquiry-based learning, competency to deal with content/technological tools, how do they communicate problems/need of the teacher etc.), i.e. all actions/reactions of students.

Appendix Eight: Learning Designs, Moodle Screenshots

Case Study 5

CS5: Geography: North Africa and economic development

Νότιος Αφρική και οικονομική ανάπτυξη

1. Προσέλκυση ενδιαφέροντος:

Τι είναι η πλατίνα;

Πού είναι το Ρουστενμπέρκ;

Πρέπει πρώτα να απαντήσουμε αυτά τα ερωτήματα πριν να δείτε το φλιπ και να συμπληρώσετε το δελτίο εισόδου.

1. **Attracting students' interest:**
What is platinum? Where is Rustenberg?
(**Introductory in-class session**: Inquiry questions)
Answer them before watching the flip and completing the entrance ticket.

2. Φλιπ και Δελτίο εισόδου:

Παρακολουθήστε το πιο κάτω βίντεο:

2. **Pre-class/Flip & Entrance ticket:**
Watch the video below (**Flip**: video)
Answer in your Geography exercise books the questions below… (**Entrance ticket**: questions on the flip)

Απαντήστε στο τετράδιο Γεωγραφίας τα πιο κάτω ερωτήματα:

(α) Για ποιο λόγο έγινε η απεργία στο ορυχείο;

(β) Γιατί θα αντιμετωπίσει η Ν Αφρική πρόβλημα στην οικονομία αν συνεχ

(γ) Γιατί υπάρχει έλλειψη σε εργάτες για τα ορυχεία (δηλαδή αυξημένη ζήτ σε ένα ορυχείο;

3. Στην τάξη:

(α) Επισκόπηση του δελτίου εισόδου

(β) Σύνδεση με το σημερινό μάθημα- Διερεύνηση

Μελετήστε τις σελίδες 78-82. Καταγράψετε τα πιο σημαντικοούς λόγους στ της Νοτίου Αφρικής. Δημιουργήστε ένα ιδεόγραμμα με τις βασικές παραμέ

Τυπώστε και κολλήστε το στο τετράδιό σας.

4. Επέκταση: Ας παίξουμε!!! 'Η οικονομία της Ν. Αφρικής"

Ας πιάσουμε τις λέξεις κλειδιά κι ας παίξουμε παντομίμα. Χωριστείτε σε 2 ομάδες. Έχετε 4 λεπτά για να βρείτε όσες περισσότερες λέξεις μπορείτε η κάθε ομάδα (τα 2 σώματα σε ένα όμως). Πρώτα παίζει η μια ομάδα και μετά η άλλη.

3. In-class:
(a) Review of entrance ticket
(b) Link to today's lesson- IBL session
Study pages 78-82. Write down the most important reasons of economic growth in North America. Create a mind-map with the basic parameters. Print it and stick it in your exercise books. (**IBL-mind map**)

4. **After-class/Extending the lesson: Let's play!!! 'The economy of South Africa'**
Let's use the key words and **play a pantomime game**. Split into 2 groups. You have 4 minutes to find as many words as you can…
(Further activities: pantomime game)

CS5: Science-Heat & Temperature

Attracting students' interest:
Mr Antonis takes a pizza out of the freezer and puts it in a heated oven. After some time, and after the pizza had been cooked, he opens the oven, he takes it out and places it near the window. Discuss in the chat Mr Antonis actions (**Introductory in-class session**: Moodle chat).

Θερμότητα-Θερμοκρασία

Αφόρμηση- Συζήτηση στο chat

«Ο κύριος Αντώνης παίρνει από την κατάψυξη μια παγωμένη πίτσα και την βάζει στον αναμμένο φούρνο. Μετά από λίγη ώρα και αφού η πίτσα ψήθηκε, ανοίγει το φούρνο και βάζει την πίτσα κοντά στο παράθυρο».

Δικαιολογείστε τις διάφορες ενέργειες του κύριου Αντώνη στο chat

Εισαγωγική δραστηριότητα:

«Με ποιους τρόπους διαδίδεται θερμότητα;»

Πώς διαδίδεται η θερμότητα στα στερεά;

Πείραμα Φύλλο Εργασίας 1: σελ. 22

Pre-class/Flip & Entrance ticket:
Watch the video (**Flip**: video from YouTube)
Entrance ticket: Worksheet #1
Self-assessment: *Correct activities 3, 4 and 5 before coming back to class*

Εργασία 3:

Οι πινέζες να πέφτουν με τη σειρά, με πρώτη την πλησιέστερη προς την φλόγα, δεύτερη τη μεσαία και τρίτη την πλησιέστερη προς τη χειρολαβή.

Εργασία 4:

- *Οι πινέζες έπεσαν, γιατί η θερμότητα από την άκρη του μαχαιριού διαδόθηκε στα σημεία που βρισκόταν το κερί, το έλιωσε και έπεσαν οι πινέζες.*
- *Πρώτα διαδόθηκε στο κερί που βρισκόταν πιο κοντά στη φλόγα και έπειτα με τη σειρά στις επόμενες θέσεις του.*

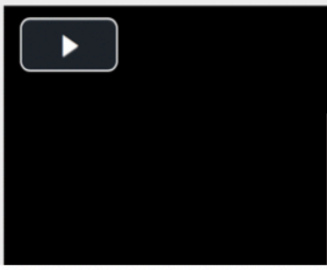
Εργασία 5:

Η θερμότητα στα στερεά διαδίδεται από σημείο σε σημείο.

ή

Η διάδοση της θερμότητας στα στερεά γίνεται από σημείο σε σημείο.

Φύλλο Εργασίας 2:



3. In-class:
(a) Review of questions and answers on worksheet
(b) Link to today's lesson- IBL session Worksheet 2 (**IBL**: Watch the video, execute the experiments, write investigations)

Αναμένεται να αναφέρουν ότι το νερό κατεβαίνει από τη πλευρά του σωλήνα όπου δεν ζεσταίνεται το νερό. Πλησιάζει στο σημείο όπου ζεσταίνεται και όταν ζεσταθεί ανεβαίνει προς τα πάνω.

Εργασία 6:

- Τι παθαίνει το νερό όταν θερμανθεί ; *(Το νερό που θερμαίνεται κοντά στη φλόγα ανέρχεται προς τα πάνω.)*
- Ποιες κινήσεις υπάρχουν στη μάζα του νερού;

(Το μέρος του νερού που θερμαίνεται ανεβαίνει και το μέρος που είναι κρύο κατεβαίνει και έτσι η θερμότητα διαδίδεται σε όλη την ποσότητά του.)

ΠΡΟΒΛΗΜΑΤΙΣΜΟΣ

Ο εκπαιδευτικός καλεί τους μαθητές να φέρουν στη μνήμη τους περιπτώσεις στις οποίες ζεσταίνουν μια ποσότητα υγρού και να αναφέρουν σε πιο σημείο βρίσκεται η πηγή θέρμανσης (φλόγα, μάτι κουζίνας). Αναφέρεται ότι η πηγή θέρμανση βρίσκεται στο κάτω μέρος του δοχείου γιατί έτσι θα ζεσταθεί το νερό που βρίσκεται στον πυθμένα και ακολούθως λόγω της κίνησης θα ζεσταθεί ολόκληρη η μάζα του. Προβληματίζει τους μαθητές σχετικά με το πώς θα άλλαζε αυτό αν η πηγή θέρμανσης ήταν τοποθετημένη στο πάνω μέρος του δοχείου που περιέχει το νερό

Εργασία 6: Συγκεκριμένα προβλέπουν και σχεδιάζουν τη ροή της θερμότητας σε ένα πείραμα, στο οποίο το υγρό θερμαίνεται στο πάνω μέρος, αντί στο κάτω, αιτιολογώντας την απάντησή τους. Αναμένεται να επισημάνουν ότι δεν μπορούν να υπάρξουν ούτε ανοδικές ούτε καθοδικές κινήσεις του νερού, αφού το θερμό μέρος του, που θα ανέβαινε βρίσκεται στο πάνω μέρος και το κρύο μέρος του που θα κατέβαινε βρίσκεται στο κάτω μέρος.

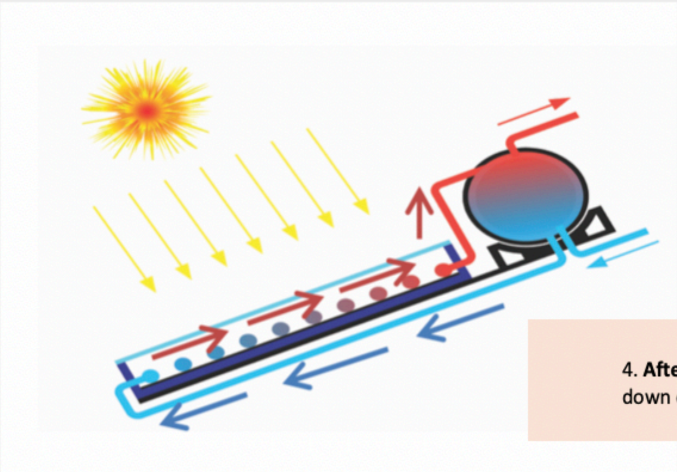
Στην Εργασία 7 οι ομάδες καταγράφουν το συμπέρασμα που προκύπτει από τις ερμηνείες των αποτελεσμάτων:

Το μέρος του νερού που θερμαίνεται ανεβαίνει. Το μέρος του νερού που είναι κρύο κατεβαίνει και ανεβαίνει όταν θερμανθεί.

Στο σημείο αυτό τονίζεται ότι η κίνηση συγκεκριμένης ποσότητας ύλης (στερεού, υγρού ή αερίου) προς μια προς μια κατεύθυνση ονομάζεται ρεύμα. Επειδή στη συγκεκριμένη περίπτωση έχουμε διάδοση θερμότητας μέσω ρευμάτων (νερού) ο συγκεκριμένος τρόπος διάδοσης ονομάζεται και ρεύματα μεταφοράς.

Ο όρος αναγράφεται στον πίνακα και συμπληρώνει τα συμπεράσματα των παιδιών, όπως πιο κάτω:

Η θερμότητα στα υγρά διαδίδεται με ρεύματα μεταφοράς



4. **After-class/Extending the lesson:** Write down conclusions is the Moodle forums.

Φόρουμ- θερμοκρασία/θερμότητα Edit

Συζήτηση θερμοκρασία-θερμότητα Edit

Add an activity or resource

CS5: Greek Language-Writing recipes, grammar: use of commands/imperatives

Ενότητα 4

1. Attracting students' interest: The teacher reads the given text with the students and initial processing is done.

Στάδιο 1ο: Στο σχολείο- 40'

Προσέλκυση ενδιαφέροντος: Ανάγνωση και επεξεργασία του κειμένου σελ. 47

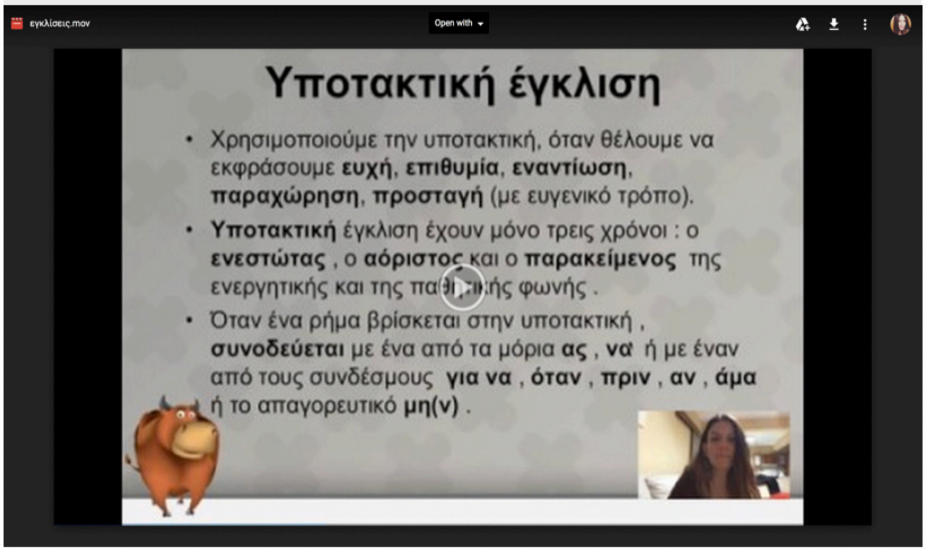
Στάδιο 2ο: Στο σπίτι- 30'

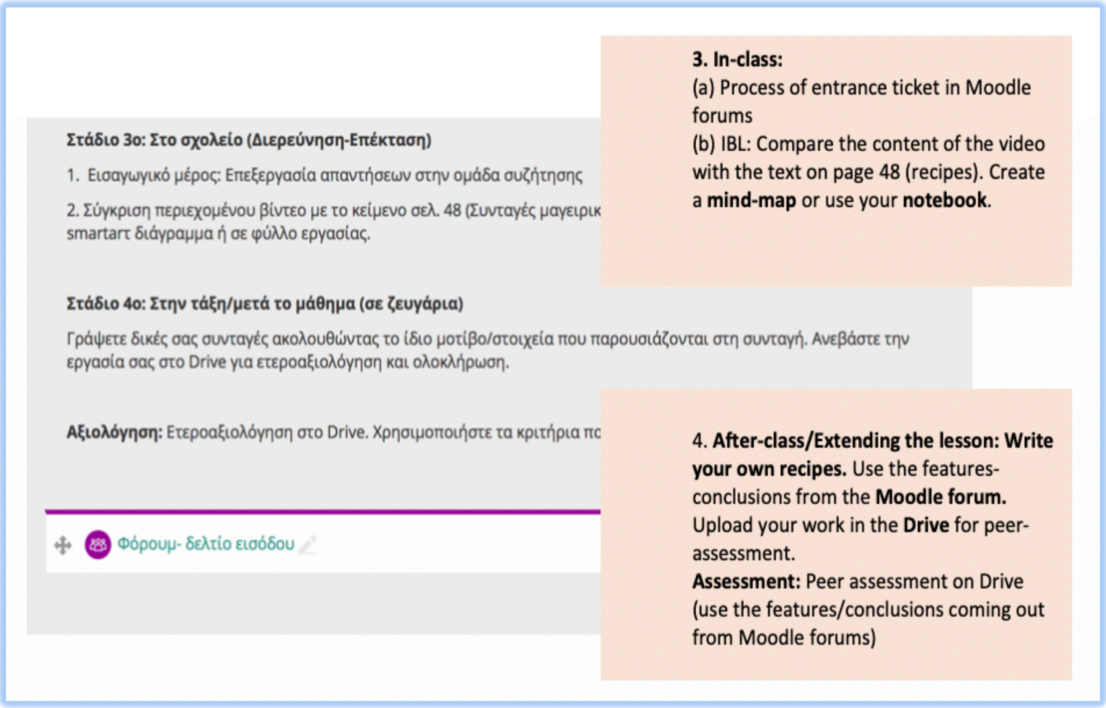
Οδηγίες:

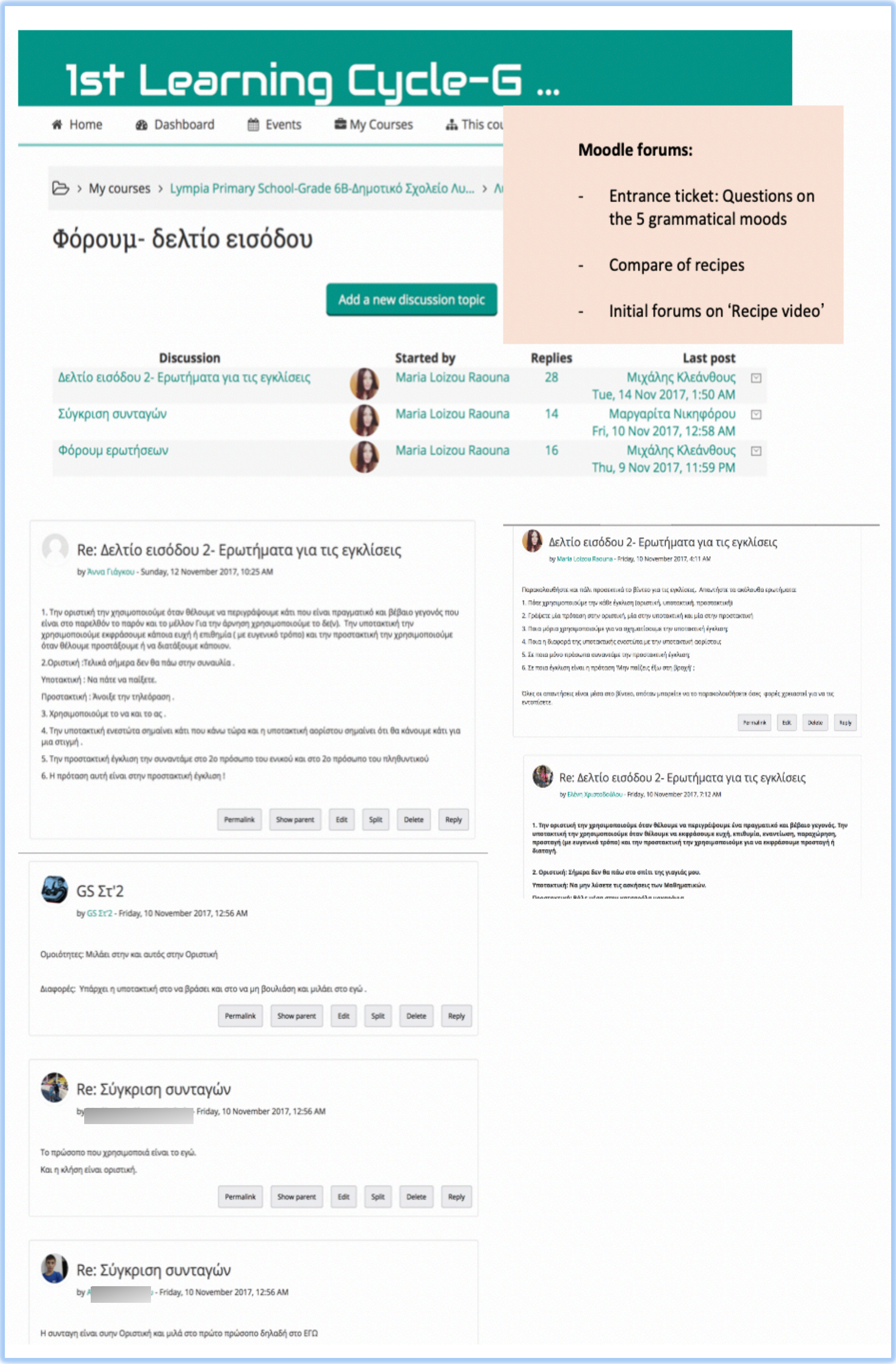
1. Παρακολουθήστε προσεκτικά το βίντεο- συνταγή και το βιντεομάθημα για τις εγκλίσεις πιο κάτω.
2. Απαντήστε στα ερωτήματα που υπάρχουν στην ομάδα συζήτησης

2. Pre-class/Flip & Entrance ticket:

- (a) Watch the video on the recipes carefully
- (b) Watch the **flip video on the new grammar rules (5 grammatical moods in verbs).** You will need to answer the questions in the Moodle forum
- **Entrance ticket**: Questions on




Στάδιο 3ο: Στο σχολείο (Διερεύνηση-Επέκταση)
1. Εισαγωγικό μέρος: Επεξεργασία απαντήσεων στην ομάδα συζήτησης
2. Σύγκριση περιεχομένου βίντεο με το κείμενο σελ. 48 (Συνταγές μαγειρικ
smartart διάγραμμα ή σε φύλλο εργασίας.
Στάδιο 4ο: Στην τάξη/μετά το μάθημα (σε ζευγάρια)
Γράψετε δικές σας συνταγές ακολουθώντας το ίδιο μοτίβο/στοιχεία που παρουσιάζονται στη συνταγή. Ανεβάστε την εργασία σας στο Drive για ετεροαξιολόγηση και ολοκλήρωση.
Αξιολόγηση: Ετεροαξιολόγηση στο Drive. Χρησιμοποιήστε τα κριτήρια πο
Φόρουμ- δελτίο εισόδου
3. In-class:
(a) Process of entrance ticket in Moodle forums
(b) IBL: Compare the content of the video with the text on page 48 (recipes). Create a mind-map or use your notebook.
4. After-class/Extending the lesson: Write your own recipes. Use the features-conclusions from the Moodle forum. Upload your work in the Drive for peer-assessment.
Assessment: Peer assessment on Drive (use the features/conclusions coming out from Moodle forums)


1st Learning Cycle-G ...
Home
Dashboard
Events
My Courses
This cou
My courses
Lympia Primary School-Grade 6B-Δημοτικό Σχολείο Λυ...
Φόρουμ- δελτίο εισόδου
Add a new discussion topic
Discussion
Started by
Replies
Last post
Δελτίο εισόδου 2- Ερωτήματα για τις εγκλίσεις
Maria Loizou Raouna
28
Μιχάλης Κλεάνθους
Tue, 14 Nov 2017, 1:50 AM
Σύγκριση συνταγών
Maria Loizou Raouna
14
Μαργαρίτα Νικηφόρου
Fri, 10 Nov 2017, 12:58 AM
Φόρουμ ερωτήσεων
Maria Loizou Raouna
16
Μιχάλης Κλεάνθους
Thu, 9 Nov 2017, 11:59 PM
Moodle forums:
- Entrance ticket: Questions on the 5 grammatical moods
- Compare of recipes
- Initial forums on 'Recipe video'
Re: Δελτίο εισόδου 2- Ερωτήματα για τις εγκλίσεις
by Άννα Γιάγκου - Sunday, 12 November 2017, 10:25 AM
1. Την οριστική την χησιμοποιούμε όταν θέλουμε να περιγράψουμε κάτι που είναι πραγματικό και βέβαιο γεγονός που είναι στο παρελθόν το παρόν και το μέλλον Για την άρνηση χρησιμοποιούμε το δε(ν). Την υποτακτική την χρησιμοποιούμε εκφράσουμε κάποια ευχή ή επιθημία (με ευγενικό τρόπο) και την προστακτική την χρησιμοποιούμε όταν θέλουμε προστάξουμε ή να διατάξουμε κάποιον.
2.Οριστική :Τελικά σήμερα δεν θα πάω στην συναυλία .
Υποτακτική : Να πάτε να παίξετε.
Προστακτική : Άνοιξε την τηλεόραση .
3. Χρησιμοποιούμε το να και το ας .
4. Την υποτακτική ενεστώτα σημαίνει κάτι που κάνω τώρα και η υποτακτική αορίστου σημαίνει ότι θα κάνουμε κάτι για μια στιγμή .
5. Την προστακτική έγκλιση την συναντάμε στο 2ο πρόσωπο του ενικού και στο 2ο πρόσωπο του πληθυντικού
6. Η πρόταση αυτή είναι στην προστακτική έγκλιση !
Permalink
Show parent
Edit
Split
Delete
Reply
Δελτίο εισόδου 2- Ερωτήματα για τις εγκλίσεις
Re: Δελτίο εισόδου 2- Ερωτήματα για τις εγκλίσεις
GS Στ'2
by GS Στ'2 - Friday, 10 November 2017, 12:56 AM
Ομοιότητες: Μιλάει στην και αυτός στην Οριστική
Διαφορές: Υπάρχει η υποτακτική στο να βράσει και στο να μη βουλιάσει και μιλάει στο εγώ .
Permalink
Show parent
Edit
Split
Delete
Reply
Re: Σύγκριση συνταγών
Friday, 10 November 2017, 12:56 AM
Το πρόσωπο που χρησιμοποιεί είναι το εγώ.
Και η κλίση είναι οριστική.
Permalink
Show parent
Edit
Split
Delete
Reply
Re: Σύγκριση συνταγών
Friday, 10 November 2017, 12:56 AM
Η συνταγή είναι στην Οριστική και μιλά στο πρώτο πρόσωπο δηλαδή στο ΕΓΩ

CS5: Greek Language: 'Flying Books'

Flying Books!!!

Edit

1. **Attracting students' interest:**
In class: Lesson on Mahara platform: YouTube video: 'Flying Books'

Στάδιο 1ο: Στο σχολείο

Μάθημα στο Mahara (Μάθημα 1ο)

Στάδιο 2: Στο σπίτι

Παρακολουθήστε το πιο κάτω βιντεομάθημα για τις τεχνικές αφήγης
κάτω.

ΒΙΝΤΕΟ

https://drive.google.com/file/d/1VVLtT6JlwMdlmzDKi2SGVcVACA7oT6

2. Pre-class/Flip & Entrance ticket:
(a) Watch your teachers' **video-flip** (prepared on Camtasia) on narration techniques.
(b) **Entrance ticket**: Answer the questions in the **Moodle forum** below.

Στάδιο 3: Στο σχολείο

1. Επαναφορά στις τεχνικές αφήγησης (βιντεομάθημα)
2. Επεξεργασία των απαντήσεων ως δελτίο εισόδου
3. Αποφασίζουμε ποιοι ήταν οι κεντρικοί ήρωες στο κείμενο και οι μαθητές συμπληρώνουν το ιδεόγραμμα με παραμέτρους: ήρωες ιστορίας, αντικείμενα που προσωποποιούνται, μεταφορές, σημαντικά γεγονότα
4. Αποφασίζουμε τον τρόπο που θα γίνει η αφήγηση: Θα χωριστεί η αφήγηση σε 5 μέρη (ανά 3 λεπτά)...θα την επεξεργαζόμαστε και στη συνέχεια τα παιδιά θα συνεχίζουν την αφήγηση [Εργασία στα πιο κάτω wikis].
5. Ετεροαξιολόγηση με βάση τα κριτήρια της αφήγησης

3. In-class:
(a) Discussion, entrance ticket analysis
(b) **IBL**- prepare a mind-map with the main parameters for creating a narration for the silent video 'Flying books.
(c) The narration is divided into 5 parts (each group will prepare a 3' narration, total video time is 15'). Students use the Moodle wikis.
(d) Peer-assessment: use the narration criteria which arouse from the entrance ticket.


Στάδιο 4: Στο σπίτι
(α) Αυτοαξιολόγηση: Πίνακας αυτοαξιολόγησης για να συμπληρωθεί από τα παιδιά
(β) Αναστοχασμός: Στο φόρουμ πιο κάτω
Στάδιο 5: Στο σχολείο
(α) Τεκμήρια μάθησης στο ημερολόγιο 'Η μάθησή μου' (Σύνδεσμος αφήγησης)
(β) Καταχώρηση πίνακα αυτοαξιολόγησης και αναστοχασμού στο ημερολόγιο 'Η μάθησή μου' (Αυτοαξιολόγηση)
4. After-class/assessment:
(a) Self-assessment: Complete the self-assessment rubric.
(b) Reflection: Write your reflection on the lesson in the Moodle forum below.
5. E-portfolio development: Upload evidence on your 'My learning-journal'
Δελτίο εισόδου- ερωτήματα
Wiki 1
Wiki 2
Wiki 3
Wiki 4
Wiki 5
Wiki 6
Wki 7
Wiki 8
Edit
Add an activity or resource

CS5: Greek Language: Literature book 'Sebastian'

Υποθετικές προτάσεις

1. Attracting students' interest:
In class: We all read together pages 61-64. Discussion and completion of short activities, pg. 64-65.

Στάδιο 1ο: Στο σχολείο: Προσέλκυση ενδιαφέροντος

- Ανάγνωση του παραμυθιού σελ.61-62-63-64

-Επεξεργασία μέσα από τις ασκήσεις 1-3 του βιβλίου σελ. 64-65

Στάδιο 2ο- Στο σπίτι

-Παρακολουθήστε το βιντεομάθημα για τον υποθετικό λόγο:

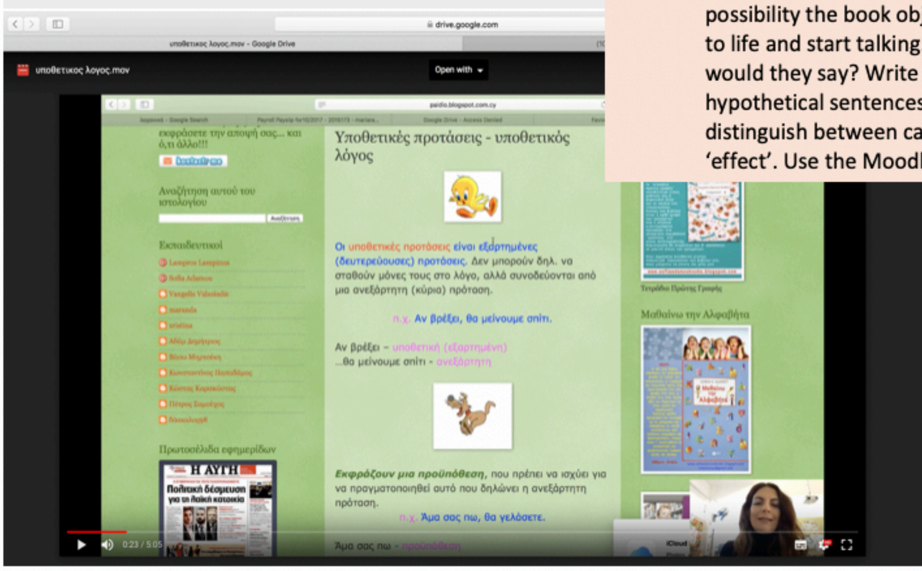
https://drive.google.com/file/d/1z8yrK-g43O2Cau13wEbsunVwfj65puGV/view?usp=sharing

-Δελτίο εισόδου: Σκεφτείτε ότι τα πράγματα μέσα στο παραμύθι του Σεμπάστιαν άρχισαν να μιλούν. Τι θα έλεγαν στο Σεμπάστιαν; Καταγράψετε στο φόρουμ 5 υποθετικές προτάσ... απόδοση κάθε φορά.

Π.χ. Γρασίδι: Εάν δε με κουρέψεις σήμερα, αύριο δε θα είσαι καλά.

(Υπόθεση: Εάν δε με κουρέψεις σήμερα, Απόδοση: Αύριο δε θα είσα καλά)

2. Pre-class/Flip & Entrance ticket:
(a) Watch your teachers' **video-flip** (prepared on Camtasia) on hypothetical sentences
(b) **Entrance ticket**: 'Think of the possibility the book objects come to life and start talking. What would they say? Write 5 hypothetical sentences, distinguish between cause' and 'effect'. Use the Moodle forum.



Στάδιο 3ο- Στην τάξη

1. Δραματοποίηση υποθετικών προτάσεων (επίλυση αποριών κλπ)

2. Ολοκλήρωση άσκησης 5 σελ. 66 στο βιβλίο Γλώσσας

3. Επέκταση: Χρησιμοποιήστε τα έτοιμα templates για να δημιουργήσετε πα
Τριβιζά αλλά εντάσσοντας τον υποθετικό λόγο μέσα στα κλειδιά που θα δώσ
Τερηδόνα ήταν η πιο όμορφη, τότε δε θα υπήρχε η ...... Στο ταμπού χρησιμοπ
που θα απαγορεύσετε.

Για 'Φιδάκι' χρησιμοποιήστε το σύνδεσμο http://www.sightwords.com/sight-
creator/#instructions

Για σταυρόλεξα χρησιμοποιήστε https://worksheets.theteacherscorner.net/make-y

Για παζλ https://www.jigsawplanet.com/?rc=createpuzzle {Εδώ δημιουργήστε πρώτ
παραμυθιού σας, όπως στο παράδειγμα. Μπορείτε να βρείτε το Power Point που έ
φάκελο του Drive) Επίσης, δημιουργήστε ένα δεύτερο παζλ που να είναι η εικόνα τ
σας-Παράδειγμα).

Δώστε τους συνδέσμους των παιχνιδιών που δημιουργήσατε στο φόρουμ (Θα πάτε πάνω δεξιά στο Share. θα επιλέξετε Embed, και θα σας εμφανίσει το URL)

3. In-class:
(a) Drama play in class: your sentences in the forum (entrance ticket) come to life.
(b) Complete the activities in the book (activity 5, pg. 66)
(c) Use the templates (follow the links) and create games for Trivizas fairy-tales. Use hypothetical sentences in the key-clauses. Give the links of your games in the Moodle forum.

Στάδιο 4ο- Αξιολόγηση στο φόρουμ

Καταγράψετε:

1. Πόσο εύκολο ήταν να κατανοήσετε το περιεχόμενο του βιντεομαθήματος

2. Πόσο εύκολο ή δύσκολο ήταν να συμπληρώσετε το δελτίο εισόδου

3. Πόσο σας βοήθησε το βιντεομάθημα για να κάνετε την άσκηση 5 του βιβλί

4. Τι σας άρεσε και τι δε σας άρεσε στη διαδικασία δημιουργίας των παιχνιδ

Δελτίο εισόδου- υποθετικές προτάσεις σύμφωνα με τον Σεμπάστιαν

Παιχνίδια παραμυθιών με υποθετικές προτάσεις

Αυτοαξιολόγηση-Αναστοχασμός

Add an activity or resource

4. **Assessment: Use the Moodle forum and answer the following reflection questions:**
(a) How easy was it to understand the content of the video tutorial on hypothetical sentences/reasoning.
(b) How easy/hard was it to complete the entrance ticket?
(c) How helpful had the video been for completing the activity in your book?
(d) What did you like and didn't like about the process of creating the games?

Re: Υποθετικές προτάσεις

by - Monday, 4 December 2017, 6:55 AM

Moodle forum: entrance ticket

- **Γρασίδι: Αν δεν με κουρέψεις άυριο, δεν θα ξαναβλαστίσω.**

(Υπόθεση: Αν δε με κουρέψεις αύριο, Απόδοση: Δε θα ξαναβλαστίσω).

- **Σκύλοι: Εάν δε μας μισάς, θα σου κάνω ότι χάρη θες.**

(Υπόθεση: Εάν δε μας μισάς, Απόδοση: Θα σου κάνω ότι χάρη θες).

- **Κρεβάτι: Άμα κοιμηθείς πάνω μου σήμερα, δεν θα είσαι καλά αύριο.**

(Υπόθεση: Άμα κοιμηθείς πάνω μου σήμερα, Απόδοση: Δεν θα είσαι καλά αύριο.

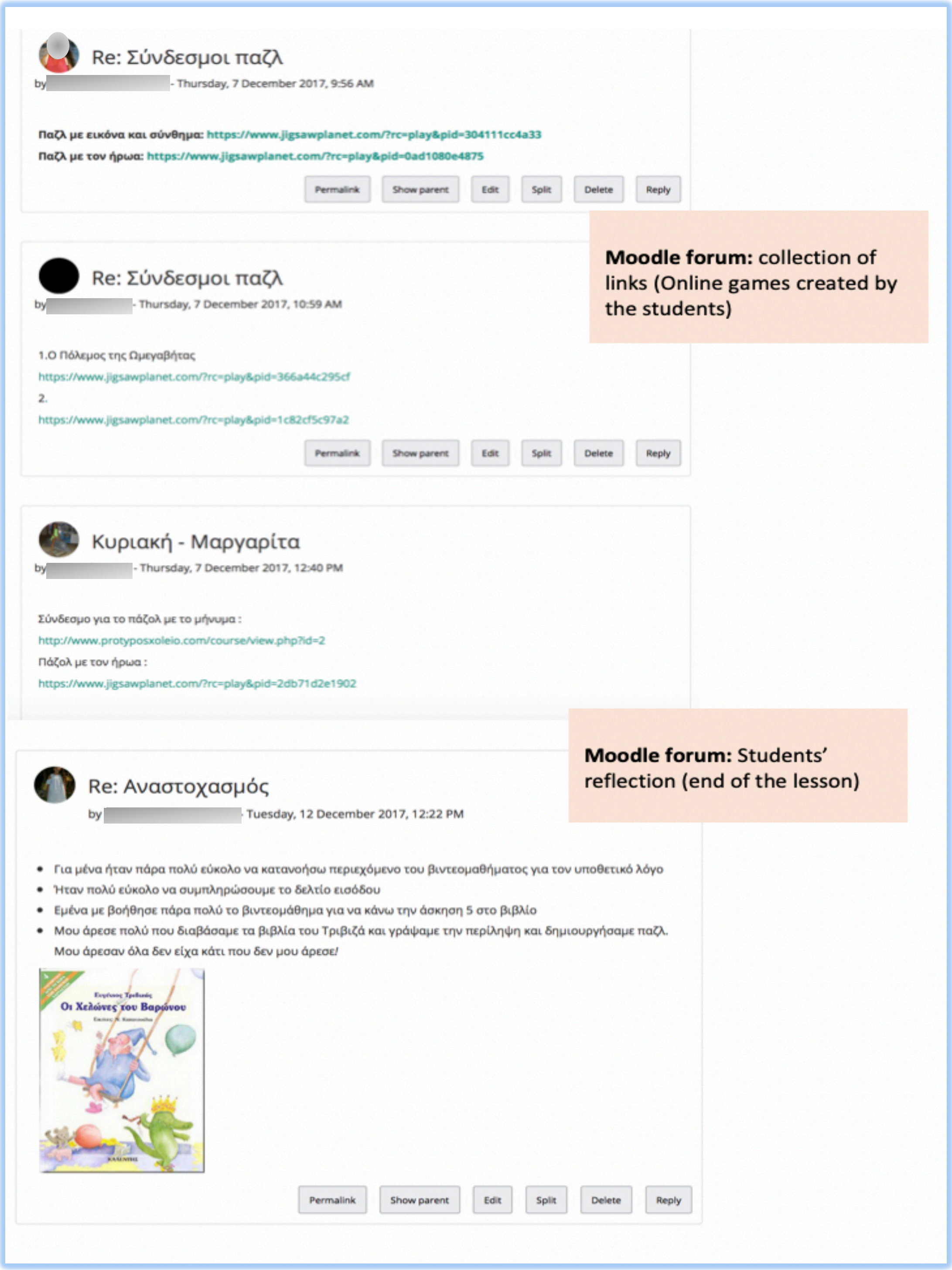
- **Coflex: Αν φας coflex, θα πονέσει η κοιλιά σου.**

(Υπόθεση: Αν φας coflex, Απόδοση: Θα πονέσει η κοιλιά σου).

- **Μπανιέρα: Άμα κάνεις μπάνιο σήμερα, δεν θα έχει νερό.**

(Υπόθεση: Άμα κάνεις μπάνιο σήμερα, Απόδοση: Δεν θα έχει νερό).

Permalink | Show parent | Edit | Split | Delete | Reply


Re: Σύνδεσμοι παζλ
by - Thursday, 7 December 2017, 9:56 AM
Παζλ με εικόνα και σύνθημα: https://www.jigsawplanet.com/?rc=play&pid=304111cc4a33
Παζλ με τον ήρωα: https://www.jigsawplanet.com/?rc=play&pid=0ad1080e4875
Permalink
Show parent
Edit
Split
Delete
Reply
Moodle forum: collection of links (Online games created by the students)
Re: Σύνδεσμοι παζλ
by - Thursday, 7 December 2017, 10:59 AM
1.Ο Πόλεμος της Ωμεγαβήτας
https://www.jigsawplanet.com/?rc=play&pid=366a44c295cf
2.
https://www.jigsawplanet.com/?rc=play&pid=1c82cf5c97a2
Permalink
Show parent
Edit
Split
Delete
Reply
Κυριακή - Μαργαρίτα
by - Thursday, 7 December 2017, 12:40 PM
Σύνδεσμο για το πάζολ με το μήνυμα :
http://www.protyposxoleio.com/course/view.php?id=2
Πάζολ με τον ήρωα :
https://www.jigsawplanet.com/?rc=play&pid=2db71d2e1902
Moodle forum: Students' reflection (end of the lesson)
Re: Αναστοχασμός
by Tuesday, 12 December 2017, 12:22 PM
Για μένα ήταν πάρα πολύ εύκολο να κατανοήσω περιεχόμενο του βιντεομαθήματος για τον υποθετικό λόγο
Ήταν πολύ εύκολο να συμπληρώσουμε το δελτίο εισόδου
Εμένα με βοήθησε πάρα πολύ το βιντεομάθημα για να κάνω την άσκηση 5 στο βιβλίο
Μου άρεσε πολύ που διαβάσαμε τα βιβλία του Τριβιζά και γράψαμε την περίληψη και δημιουργήσαμε παζλ. Μου άρεσαν όλα δεν είχα κάτι που δεν μου άρεσε!
Οι Χελώνες του Βαρώνου
Permalink
Show parent
Edit
Split
Delete
Reply

CS5: Greek language: Grammar: Indefinite articles

Έναρθρα και άναρθρα ουσιαστικά

Στάδιο 1:

Παραμύθι: Μια μαγική ιστορία

http://www.care.gr/post/6366/paramythi-mia-magiki-istoria

1. Attracting students' interest:
In class: 'Magic story'- Discussion

Στάδιο 2: Στο σπίτι

Παρακολουθήστε το βιντεομάθημα.

https://drive.google.com/file/d/14_VOjGTGJiv7aFlz97I20FOMq0J8yvCF/view?usp=sharing

Επιπλέον πληροφορίες:

- **Το οριστικό άθρο:**

  Το βάζουμε υποχρεωτικά μπροστά από ένα ουσιαστικό ***(και έχουμε έναρθρο ουσιαστικό)***, όταν μιλάμε για ορισμένο, συγκεκριμένο πρόσωπο ή πράγμα.

  π.χ.: **Βάλε **τα** λουλούδια εκεί.* (= τα συγκεκριμένα λουλούδια, όχι κάποια λουλούδια γενικά κι αόριστα, όπως θα σήμαινε αν γράφαμε: - *Βάλε λουλούδια εκεί.*-)

  Ο Κώστας και **η** Ελένη είναι καλοί φίλοι.*

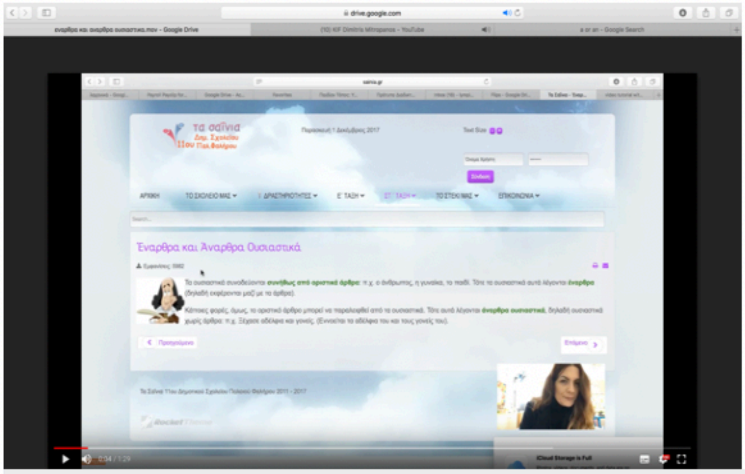
  > ***Σημείωση:*** Βάζουμε υποχρεωτικά άρθρο πριν από κύρια ονόματα, εκτός αν έχουμε κλητική προσφώνηση ή αν το όνομα βρίσκεται μετά τα ρήματα *λέγομαι, ονομάζομαι, καλούμαι.*
  > π.χ.: **Νίκο, έλα γρήγορα εδώ!* **Λέγομαι Κώστας Παπαγεωργίου.*

Δεν το βάζουμε μπροστά από ένα ουσιαστικό ***(και έχουμε άναρθρο ουσιαστικό)*** όταν μιλάμε γενικά κι αόριστα για κάποιο πρόσωπο, ζώο ή πράγμα.

π.χ.: *Φόρεσε αμέσως καπέλο* (= κάποιο καπέλο γενικά, όχι ένα συγκεκριμένο καπέλο, όπως θα σήμαινε αν γράφαμε: - *Φόρεσε αμέσως το καπέλο σου!*-).

Συμπληρώστε το δελτίο εισόδου στο φόρουμ:

2. Pre-class/Flip & Entrance ticket:
(a) **Flip**: (i)Watch the teachers' video-flip; (ii) More information: text on Moodle
(b) **Entrance ticket**: Moodle forum with activities to fill-in



ΑΣΚΗΣΕΙΣ

1. Να συμπληρώσετε στο παρακάτω κείμενο τα οριστικά ή τα αόριστα άρθρα, ΟΠΟΥ νομίζετε ότι χρειάζονται.

... Ελλάδα είναι κατά βάση ... ορεινή χώρα, με αποτέλεσμα να υπάρχουν ... πολλά εδάφη για ... καλλιέργεια. Σε πολλές περ ιδιαίτερα γύρω από ... Σπάρτη, ... έδαφος ήταν κατάλληλο μον βόσκουν ... αιγοπρόβατα και να φυτρώνουν ... ελιές. Έτσι...Σ δεν ασχολήθηκαν με ... καλλιέργεια ... γης, ... εργασία που αφορούσε αποκλειστικά ... είλωτες.

3. In-class:
Apply the new knowledge in filling-in the gaps
No IBL activities…

CS5: Greek Language- Expressions

Εκφράσεις-Συμφράσεις

1. Attracting students' interest:
In class: Text- Finding expressions

Στάδιο 1ο: Κείμενο σελ. 58- Βιβλίο Γλώσσας

Τι είναι οι φράσεις και οι συμφράσεις;

Παραδείγματα!!!

- Γάλα εβαπορέ

-Κέικ σοκολάτα

-Κουταλιές σούπας

-Κέικ γλύκισμα/σοκολάτας

-Πεπτικό σύστημα

-Ποιότητα ζωής

-Γίνω καπνός

2. Pre-class/Flip & Entrance ticket:
(a) **Flip**: Watch the teachers' video-flip
(b) **Entrance ticket**:
Work on pg.68 in the Greek book

Στάδιο 2: Βιντεομάθημα στο σπίτι

Ακολουθήστε το σύνδεσμο για να δείτε το βιντεομάθημα

Δελτίο εισόδου: σελ. 68 στο βιβλίο Γλώσσας

Στάδιο 3: Στο σχολείο

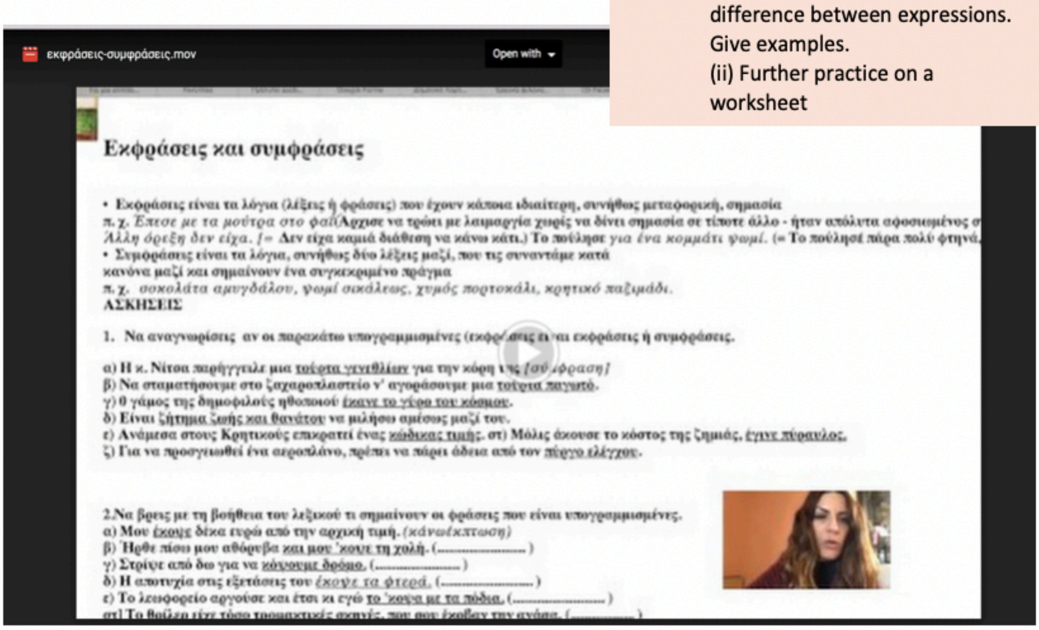
A. Φόρουμ: Ποια είναι η διαφορά των συμφράσεων από τις εκφράσεις; Δώστε παραδείγματα

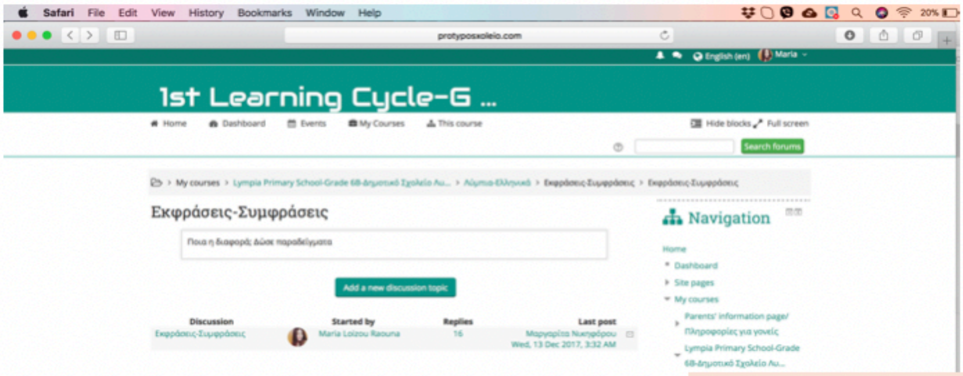
- Διόρθωση εργασιών σελ. 68

B. Εξάσκηση στο φύλλο εργασίας:http://www.e-papadakis.gr/ask_st_ekfrasis_symfrasis.html

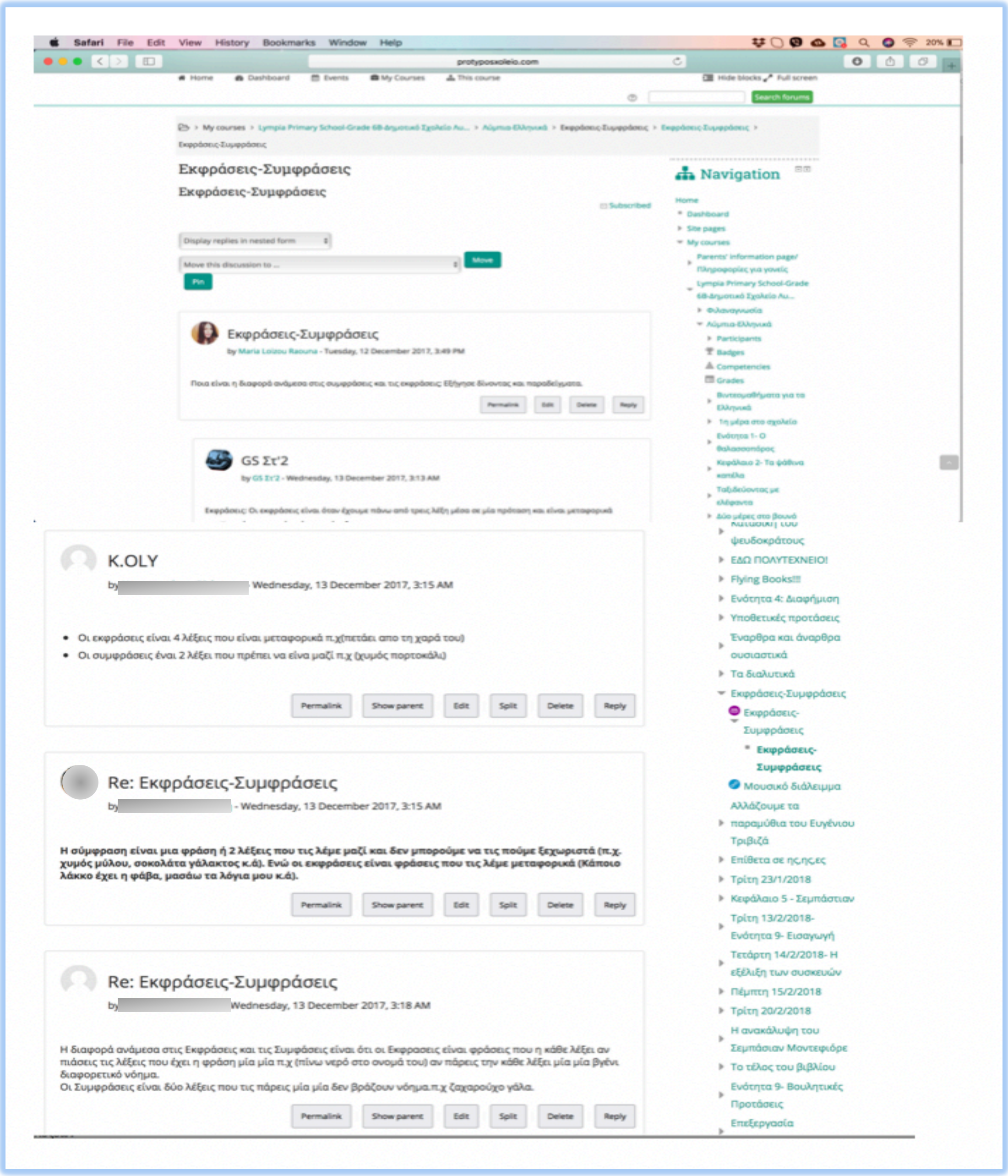
- Εξάσκηση- Κυριολεκτική σημασία μεταφορικών εκφράσεων: άσκη

3. In-class:
(i) Use the forum to discuss the difference between expressions. Give examples.
(ii) Further practice on a worksheet





Moodle forum: Discussion of the difference between expressions and examples.


Εκφράσεις-Συμφράσεις
Εκφράσεις-Συμφράσεις
Navigation
Εκφράσεις-Συμφράσεις
GS Στ'2
K.OLY
Wednesday, 13 December 2017, 3:15 AM
Οι εκφράσεις είναι 4 λέξεις που είναι μεταφορικά π.χ(πετάει απο τη χαρά του)
Οι συμφράσεις έναι 2 λέξει που πρέπει να είνα μαζί π.χ (χυμός πορτοκάλι)
Permalink
Show parent
Edit
Split
Delete
Reply
Re: Εκφράσεις-Συμφράσεις
- Wednesday, 13 December 2017, 3:15 AM
Η σύμφραση είναι μια φράση ή 2 λέξεις που τις λέμε μαζί και δεν μπορούμε να τις πούμε ξεχωριστά (π.χ. χυμός μύλου, σοκολάτα γάλακτος κ.ά). Ενώ οι εκφράσεις είναι φράσεις που τις λέμε μεταφορικά (Κάποιο λάκκο έχει η φάβα, μασάω τα λόγια μου κ.ά).
Re: Εκφράσεις-Συμφράσεις
Wednesday, 13 December 2017, 3:18 AM
Η διαφορά ανάμεσα στις Εκφράσεις και τις Συμφάσεις είναι ότι οι Εκφρασεις είναι φράσεις που η κάθε λέξει αν πιάσεις τις λέξεις που έχει η φράση μία μία π.χ (πίνω νερό στο ονομά του) αν πάρεις την κάθε λέξει μία μία βγένι διαφορετικό νόημα.
Οι Συμφράσεις είναι δύο λέξεις που τις πάρεις μία μία δεν βγάζουν νόημα.π.χ ζαχαρούχο γάλα.
ΕΔΩ ΠΟΛΥΤΕΧΝΕΙΟ!
Flying Books!!!
Ενότητα 4: Διαφήμιση
Υποθετικές προτάσεις
Έναρθρα και άναρθρα ουσιαστικά
Τα διαλυτικά
Μουσικό διάλειμμα
Τρίτη 23/1/2018
Κεφάλαιο 5 - Σεμπάστιαν
Πέμπτη 15/2/2018
Τρίτη 20/2/2018
Το τέλος του βιβλίου
Ενότητα 9- Βουλητικές Προτάσεις
Επεξεργασία

Γ. Επέκταση-διερευνητική μάθηση: Επικεντρωνόμαστε στην έκφραση 'Πές μου από πού είσαι, να σου πω τι τρως΄

Έρευνα: Πώς τρέφονται οι άνθρωποι σε χώρες κοντικές ή μακρινές;

Σημαντική πηγή για αφόρμηση: http://www.thessaliatv.gr/news/5026/pes-moy-ti-trws-na-soy-pw-apo-poy-eisai-/

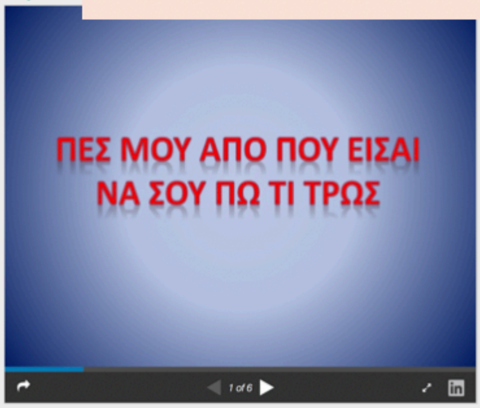
Εργασία:

Χωριστείτε σε ομάδες και διαλέξτε μια χώρα. Συγκεντρώστε υλικό για να ετοιμάσετε μια σύντομη παρουσίαση στην τάξη με τίτλο 'Πες μου από πού είσαι να σου πω τι τρως'. Οι παρακάτω ερωτήσεις θα σας βοηθήσουν:

1. Πού ακριβώς βρίσκεται η χώρα που διαλέξατε;
2. Ποιο είναι το κλίμα της και η μορφολογία του εδάφους;
3. Τι προϊόντα παράγει;
4. Ποια είναι τα χαρακτηριστικά της φαγητά; Πώς μαγειρεύονται;

3. In-class- extension to IBL
(iii) Research on different countries (based on the expressions discussed). 'Find information, answer the questions and prepare a presentation.'

Παραδείγματα:



ΠΕΣ ΜΟΥ ΑΠΟ

Examples to follow!

3ο Παράδειγμα: http://gnosi2dim.blogspot.com.cy/2012/12/blog-post_12.html

4ο Παράδειγμα: http://dim-kolossi2-lem.schools.ac.cy/index.php?id=pes-mou-ap-po-esai-na-sou-po-ti-tros

Χρησιμοποιήστε Google Slides!

Εκφράσεις-Συμφράσεις

Μουσικό διάλειμμα

CS5: Greek Language- 'Fairy-tales- Trivizas'

Αλλάζουμε τα παραμύθια του Ευγένιου Τριβιζά

1. Attracting students' interest:
In class: Research presentation

Α. Παρουσίαση στους φοιτητές μέρος της έρευνάς μας και των συμπερασμάτων μας

Β. Μάθημα Φιλαναγνωσίας:

Αφόρμηση:

2. Pre-class/Flip & Entrance ticket:
(a) **Flip**: Watch the ready-made flip (Evgenios Trivizas)
(b) **Entrance ticket**: Moodle chat
Record the advice given in the video for fairy-tale writing.
(c) Mind-map creation

Ερώτημα: Τι είδους συμβουλές έχει δώσει ο Ευγένιος Τριβιζάς για τους γονείς;

Καταγράψετε τις ιδέες σας καθώς προκύπτουν από το βίντεο στο Chat πιο κάτω

Επαναφορά:

Ποιο παραμύθι έχετε διαβάσει ο καθένας; Ποια είναι η περίληψή του; Για να θυμηθούμε επισκέπτοντας το αντίστοιχο φόρουμ,

Με ποιους τρόπους έχουμε ασχοληθεί με το περιεχόμενό τους; Δημιουργήσαμε επιτραπέζια παιχνίδια

Τι άλλο μπορούμε να δημιουργήσουμε για να έχουν τα παιδιά τριβή με τα παραμύθια αυτά- **ιδεοθύελλα στο Mindmaple!!! Ανεβάστε το ως εικόνα στο forum.**

1st Learning Cycle-G ...

Home | Dashboard | Events | My Courses | This course | Hide blocks | Full screen

My courses > Lympia Primary School-Grade 6B-Δημοτικό Σχολείο Λυ... > Λύμπια-Ελληνικά > Αλλάζουμε τα παραμύθια του Ευγένιου Τριβιζά > Συζήτηση σε πραγματικό χρόνο- chat > Chat sessions

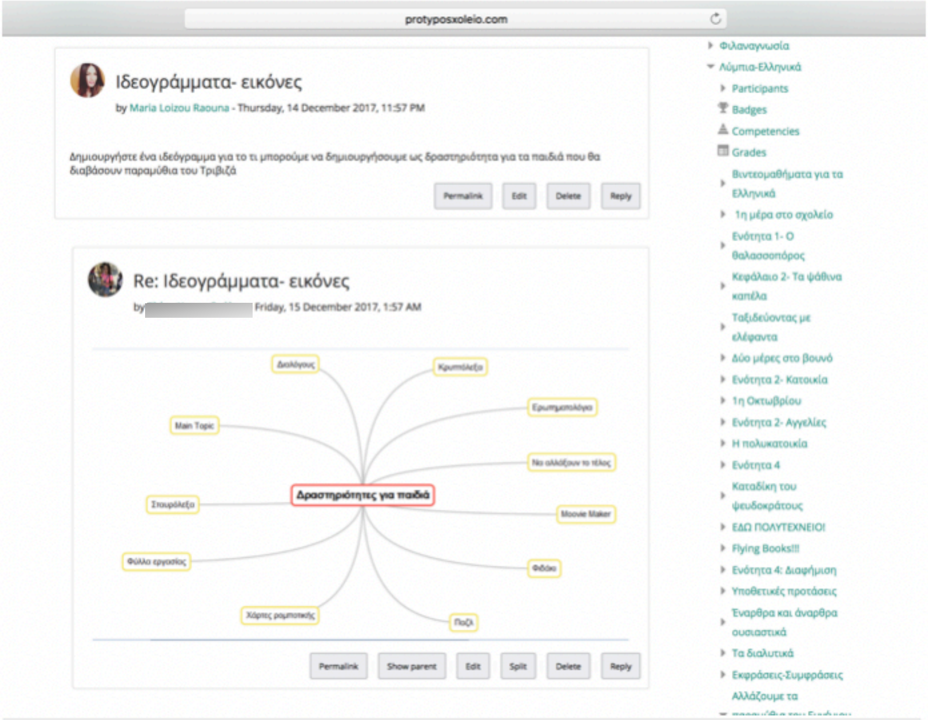
Συζήτηση σε πραγματικό χρόνο- chat

Friday, 15 December 2017, 1:37 AM --> Friday, 15 December 2017, 1:55 AM

01:37: Maria Loizou Raouna has just entered this chat
01:37: Μιχάλης Κλεάνθους has just entered this chat
01:37: Κωνσταντίνος Ολύμπιος has just entered this chat
01:37: Νικολέτα Κουτσουλλή has just entered this chat
01:37: Παναγιώτα Παναγή has just entered this chat
01:37: Αντρέας Αντρέου has just entered this chat
01:37: Μαργαρίτα Νικηφόρου has just entered this chat
01:37: Εφραίμ Κωνσταντίνου has just entered this chat
01:37: Νεφέλη Γιάγκου has just entered this chat
01:38: Άντρεα Σπύρου has just entered this chat
01:38: Ελένη Χριστοδούλου has just entered this chat
01:38: Κυριακή Λουκά has just entered this chat
01:38: Ειρήνη Κλεόπα has just entered this chat
01:38: Άννα Γιάγκου has just entered this chat
01:38: Αντρέας Αντρέου has left this chat
01:38: Μιχάλης Βλαδίμηρος Ζαβρής has just entered this chat
01:39 Ελένη:
01:39 Παναγιώτα:
1.Η φαντασία είναι πιο σημαντικη από την γνόση
01:39 Παναγιώτα:
1.Η φαντασία είναι πιο σημαντικη από την γνόση
01:40 GS:
1. Μας λέει πως όσο και αν είσε έξυπνος πρέπειν να έχεις φαντασία

Navigation

- Home
- Dashboard
- Site pages
- My courses
  - Parents' information page/ Πληροφορίες για γονείς
  - Lympia Primary School-Grade 6B-Δημοτικό Σχολείο Λυ...
    - Φιλαναγνωσία
    - Λύμπια-Ελληνικά
      - Participants
      - Badges
      - Competencies
      - Grades
      - Βιντεομαθήματα για τα Ελληνικά
      - 1η μέρα στο σχολείο
      - Ενότητα 1- Ο θαλασσοπόρος
      - Κεφάλαιο 2- Τα ψάθινα καπέλα
      - Ταξιδεύοντας με ελέφαντα
      - Δύο μέρες στο βουνό
      - Ενότητα 2- Κατοικία
      - 1η Οκτωβρίου
      - Ενότητα 2- Αγγελίες



Δημιουργικότητα:

Ομάδα Α: Φύλλα εργασίας σύμφωνα με πρότυπα 'Μικρός Αναγνώστης' (Εργαστείτε στο Drive)

Ομάδα Β' : Αλλαγή ιστοριών: Πώς θα μπορούσε να αλλάξει το τέλος του παραμυθιού σου/ να γίνει αλλιώς η ιστορία;

-Storyboard that Username: lympiaclass6b password: 17Students!!

Ομάδα Γ΄: Ένας αλλιώτικος διάλογος μέσα στην ιστορία

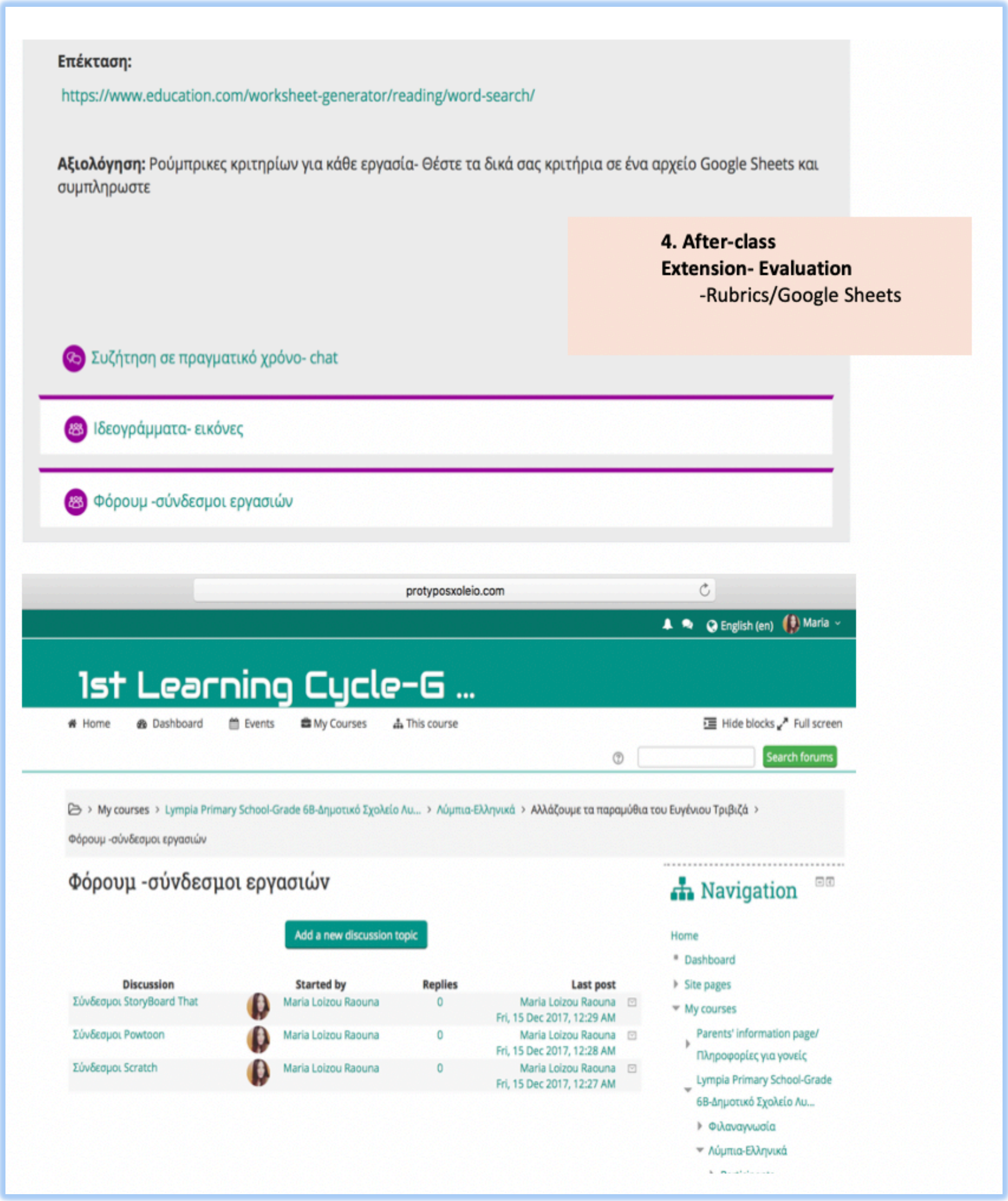
- Scratch: username: lympiaclass6b password: 17Students!!

Ομάδα Δ: Παρουσίαση του βιβλίου (βοήθημα η περίληψή σας)

-Powtoon: Username: lympiaclass6b password: 17Students!!

Δώστε τους συνδέσμους σας στο φόρουμ πιο κάτω

3. In-class- IBL/Creativity
(i) Team work (Storyboad, Scratch, Powtoon)
(ii) Share of work/links in forums


Επέκταση:
https://www.education.com/worksheet-generator/reading/word-search/
Αξιολόγηση: Ρούμπρικες κριτηρίων για κάθε εργασία- Θέστε τα δικά σας κριτήρια σε ένα αρχείο Google Sheets και συμπληρωστε
4. After-class
Extension- Evaluation
-Rubrics/Google Sheets
Συζήτηση σε πραγματικό χρόνο- chat
Ιδεογράμματα- εικόνες
Φόρουμ -σύνδεσμοι εργασιών
protyposxoleio.com
English (en)
Maria
1st Learning Cycle-G ...
Home
Dashboard
Events
My Courses
This course
Hide blocks
Full screen
Search forums
My courses › Lympia Primary School-Grade 6B-Δημοτικό Σχολείο Λυ... › Λύμπια-Ελληνικά › Αλλάζουμε τα παραμύθια του Ευγένιου Τριβιζά ›
Φόρουμ -σύνδεσμοι εργασιών
Φόρουμ -σύνδεσμοι εργασιών
Add a new discussion topic
Discussion
Started by
Replies
Last post
Σύνδεσμοι StoryBoard That
Maria Loizou Raouna
0
Maria Loizou Raouna
Fri, 15 Dec 2017, 12:29 AM
Σύνδεσμοι Powtoon
Maria Loizou Raouna
0
Maria Loizou Raouna
Fri, 15 Dec 2017, 12:28 AM
Σύνδεσμοι Scratch
Maria Loizou Raouna
0
Maria Loizou Raouna
Fri, 15 Dec 2017, 12:27 AM
Navigation
Home
Dashboard
Site pages
My courses
Parents' information page/
Πληροφορίες για γονείς
Lympia Primary School-Grade
6B-Δημοτικό Σχολείο Λυ...
Φιλαναγνωσία
Λύμπια-Ελληνικά

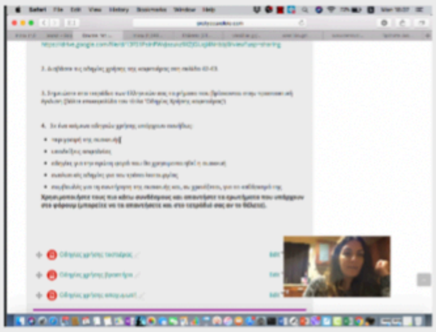
CS5: Greek Language: Instructions in how to use home appliances

Τρίτη 13/2/2018- Ενότητα 9- Εισαγωγή

1. Pre-class/Flip & Entrance ticket:
(a) **Flip**: Watch tutorial prepared by the teacher
(b) Read the instructions about the coffee maker on pg. 42-43
(c) **Entrance ticket**: Take a note of the verbs appearing in the tutorial

Καλημέρα παιδιά!

ΠΑΡΑΚΟΛΟΥΘΗΣΤΕ ΤΟ ΒΙΝΤΕΟΜΑΘΗΜΑ!!!



1. Παρακολουθήστε και το πιο κάτω βιντεομάθημα για να θυμηθείτε τις εγκλίσεις.

https://drive.google.com/file/d/13FS1PslnPWvJazukz9XZJGUqJ4NnbbJ0/view?usp=sharing

2. Διαβάστε τις οδηγίες χρήσης της καφετιέρας στη σελίδα 42-43.

3. Σημειώστε στο τετράδιο των Ελληνικών σας τα ρήματα που βρίσκονται στην προστακτική έγκλιση (βάλτε επικεφαλίδα τον τίτλο 'Οδηγίες Χρήσης καφετιέρας')

2. In-class: IBL activities
(i) Use the links to answer the questions in the forum

4. Σε ένα κείμενο οδηγιών χρήσης υπάρχουν συνήθως:

- περιγραφή της συσκευής
- υποδείξεις ασφαλείας
- οδηγίες για την πρώτη φορά που θα χρησιμοποιηθεί η συσκευή
- αναλυτικές οδηγίες για τον τρόπο λειτουργίας
- συμβουλές για τη συντήρηση της συσκευής και, αν χρειάζεται, για το καθάρισμά της

Χρησιμοποιήστε τους πιο κάτω συνδέσμους και απαντήστε τα ερωτήματα που υπάρχουν στο φόρουμ (μπορείτε να τα απαντήσετε και στο τετράδιό σας αν το θέλετε).

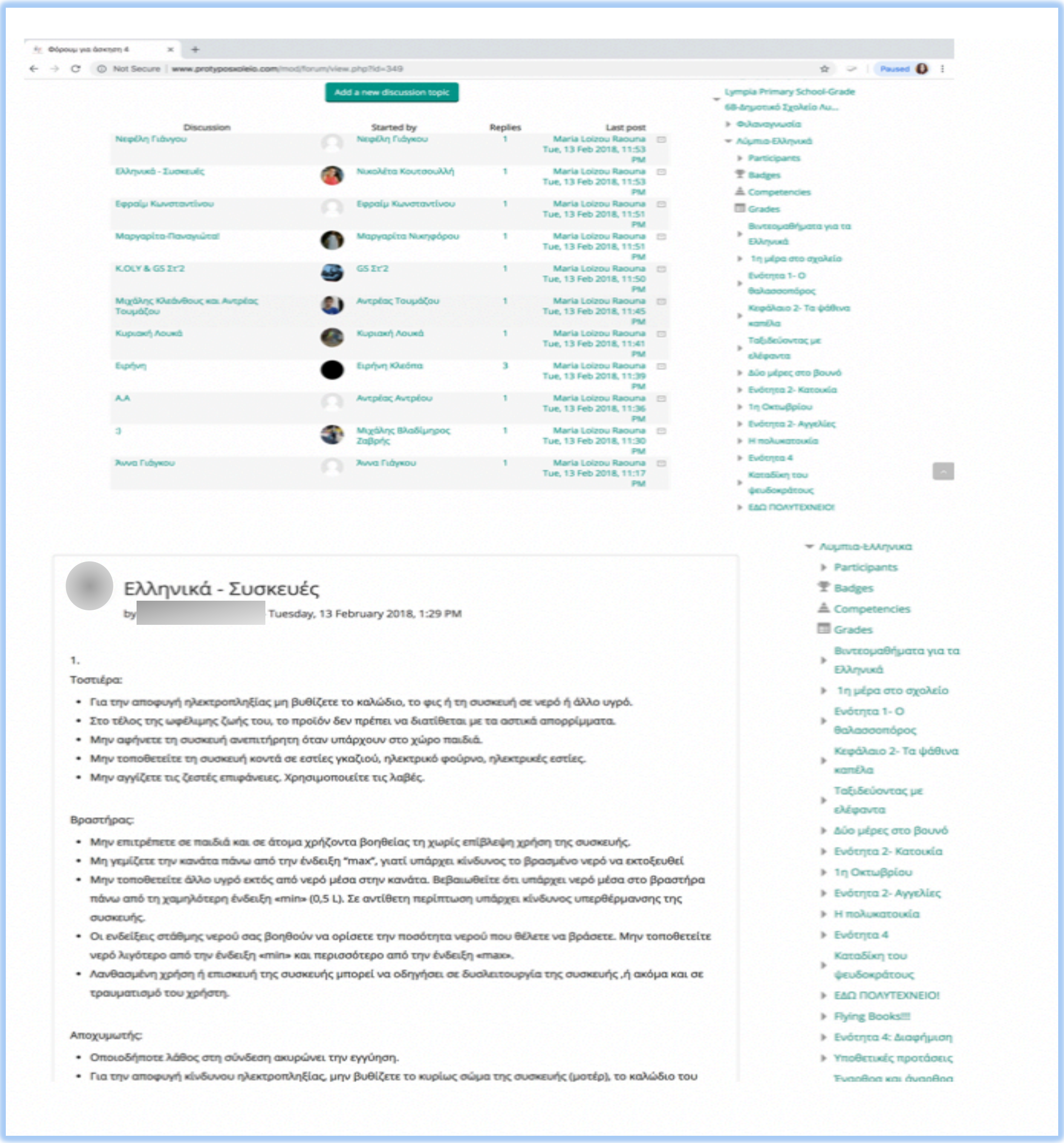
Οδηγίες χρήσης τοστιέρας

Οδηγίες χρήσης βραστήρα

Οδηγίες χρήσης αποχυμωτή

Φόρουμ για άσκηση 4

Φόρουμ απoριών Ελληνικά- Τρίτη 13/2/2018


Add a new discussion topic
Discussion
Started by
Replies
Last post
Ελληνικά - Συσκευές
by Tuesday, 13 February 2018, 1:29 PM
1.
Τοστιέρα:
Για την αποφυγή ηλεκτροπληξίας μη βυθίζετε το καλώδιο, το φις ή τη συσκευή σε νερό ή άλλο υγρό.
Στο τέλος της ωφέλιμης ζωής του, το προϊόν δεν πρέπει να διατίθεται με τα αστικά απορρίμματα.
Μην αφήνετε τη συσκευή ανεπιτήρητη όταν υπάρχουν στο χώρο παιδιά.
Μην τοποθετείτε τη συσκευή κοντά σε εστίες γκαζιού, ηλεκτρικό φούρνο, ηλεκτρικές εστίες.
Μην αγγίζετε τις ζεστές επιφάνειες. Χρησιμοποιείτε τις λαβές.
Βραστήρας:
Μην επιτρέπετε σε παιδιά και σε άτομα χρήζοντα βοηθείας τη χωρίς επίβλεψη χρήση της συσκευής.
Μη γεμίζετε την κανάτα πάνω από την ένδειξη "max", γιατί υπάρχει κίνδυνος το βρασμένο νερό να εκτοξευθεί
Μην τοποθετείτε άλλο υγρό εκτός από νερό μέσα στην κανάτα. Βεβαιωθείτε ότι υπάρχει νερό μέσα στο βραστήρα πάνω από τη χαμηλότερη ένδειξη «min» (0,5 L). Σε αντίθετη περίπτωση υπάρχει κίνδυνος υπερθέρμανσης της συσκευής.
Οι ενδείξεις στάθμης νερού σας βοηθούν να ορίσετε την ποσότητα νερού που θέλετε να βράσετε. Μην τοποθετείτε νερό λιγότερο από την ένδειξη «min» και περισσότερο από την ένδειξη «max».
Λανθασμένη χρήση ή επισκευή της συσκευής μπορεί να οδηγήσει σε δυσλειτουργία της συσκευής ,ή ακόμα και σε τραυματισμό του χρήστη.
Αποχυμωτής:
Οποιοδήποτε λάθος στη σύνδεση ακυρώνει την εγγύηση.
Για την αποφυγή κίνδυνου ηλεκτροπληξίας, μην βυθίζετε το κυρίως σώμα της συσκευής (μοτέρ), το καλώδιο του
Participants
Badges
Competencies
Grades

Appendix Nine: Ethical Approval, MOEC

ΚΥΠΡΙΑΚΗ ΔΗΜΟΚΡΑΤΙΑ

ΥΠΟΥΡΓΕΙΟ
ΠΑΙΔΕΙΑΣ ΚΑΙ ΠΟΛΙΤΙΣΜΟΥ

ΔΙΕΥΘΥΝΣΗ
ΔΗΜΟΤΙΚΗΣ ΕΚΠΑΙΔΕΥΣΗΣ

Αρ. Φακ.: 7.19.46.6/37
Αρ. Τηλ. : 22800665
Αρ. Φαξ : 22809513
E-mail : dde@moec.gov.cy

25 Ιουλίου, 2017

Κυρία
Μαρία Λοΐζου Ραουνά
Αιγίου 19
2220 Λατσιά

Θέμα: Άδεια για διεξαγωγή έρευνας με μαθητές, εκπαιδευτικούς και γονείς δημοτικών σχολείων

Αγαπητή κυρία Λοΐζου Ραουνά,

Έχω οδηγίες να αναφερθώ στη σχετική με το πιο πάνω θέμα αίτησή σας προς το Κέντρο Εκπαιδευτικής Έρευνας και Αξιολόγησης, που υποβλήθηκε στις 24 Ιουνίου 2017, και να σας πληροφορήσω ότι εγκρίνεται το αίτημά σας για διεξαγωγή έρευνας με μαθητές, εκπαιδευτικούς και γονείς δημοτικών σχολείων που εσείς θα επιλέξετε, με θέμα *«Βασικές αρχές σχεδιασμού του μοντέλου ΔΜ-ΑΤ (Μοντέλο Αντεστραμμένης Τάξης για Διερευνητική Μάθηση) στη δημοτική εκπαίδευση της Κύπρου: Έρευνα δράσης βασισμένη σε πολλαπλή μελέτη περίπτωσης»*, την ερχόμενη σχολική χρονιά 2017-2018. Η απάντηση του Κέντρου Εκπαιδευτικής Έρευνας και Αξιολόγησης σας αποστέλλεται συνημμένα, για δική σας ενημέρωση. Θα πρέπει, επίσης, να παρουσιάζετε το Αναλυτικό Σχέδιο Έρευνας, σε περίπτωση που αυτό σας ζητηθεί.

2. Νοείται, βέβαια, ότι πρέπει να εξασφαλιστεί η άδεια των διευθυντών/ διευθυντριών των σχολείων, εκ των προτέρων, ώστε να ληφθούν όλα τα απαραίτητα μέτρα για να μην επηρεαστεί η ομαλή λειτουργία τους. Η έρευνα θα πρέπει να διεξαχθεί με ιδιαίτερα προσεγμένο τρόπο, ώστε να μη θίγεται το έργο των εκπαιδευτικών, το σχολικό περιβάλλον ή οι οικογένειες των μαθητών και όλες οι δραστηριότητες που θα αναπτυχθούν πρέπει να εμπίπτουν μέσα στο πλαίσιο που καθορίζεται από το Αναλυτικό Πρόγραμμα. Οι εκπαιδευτικοί πρέπει να λάβουν μέρος στην έρευνα στον μη διδακτικό τους χρόνο. Η έρευνα θα διεξαχθεί νοουμένου ότι η απώλεια του διδακτικού χρόνου των μαθητών θα περιοριστεί στον ελάχιστο δυνατό βαθμό, ενώ για τη συμμετοχή τους χρειάζεται η **γραπτή** συγκατάθεση των γονιών τους. Οι γονείς πρέπει να γνωρίζουν όλες τις σχετικές λεπτομέρειες για τη διεξαγωγή της έρευνας, καθώς και τα στάδια μέσα από τα οποία θα εξελιχθεί. Σημειώνεται, επίσης, ότι τα πορίσματά σας κρίνεται απαραίτητο να είναι ανώνυμα και οι πληροφορίες που θα συλλέξετε να τηρηθούν απόλυτα εμπιστευτικές και αποκλειστικά και μόνο για τον σκοπό της έρευνας.

Υπουργείο Παιδείας και Πολιτισμού, 1434 Λευκωσία
Τηλ.: 22800600 Φαξ: 22428277 Ιστοσελίδα: http://www.moec.gov.cy

3. Η παρούσα έγκριση παραχωρείται με την προϋπόθεση ότι τα πορίσματα της εργασίας, θα κοινοποιηθούν μόλις αυτή ολοκληρωθεί, στη Διεύθυνση Δημοτικής Εκπαίδευσης για σχετική μελέτη και κατάλληλη αξιοποίηση.

Με εκτίμηση,

(Χρίστος Χατζηαθανασίου)
για Γενική Διευθύντρια

Κοιν.: Π.Λ.Ε.
Επαρχιακά Γραφεία Παιδείας

Appendix Ten: Consent Form- Teachers

CONSENT FORM- Teachers

Lancaster University

Project Title: Establishing Universal Design Principles for an IB-FC model (FC design model for inquiry-based learning) in Primary Education in Cyprus- An action research based on multiple case study

Name of Researcher: Maria Loizou Raouna

Email: mariaraouna@gmail.com

Please tick each box

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily	☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time during my participation in this study and within 6 weeks after I took part in the study in the form of implementing the model, without giving any reason. If I withdraw within these 6 weeks during implementation or within 2 weeks after the interviews my data will be removed.	☐
3. I understand that any information given by me may be used in future reports, academic articles, publications or presentations by the researcher, but my personal information will not be included and I will not be identifiable. Fully anonymised data will be offered to LU institutional data repository and will be made available to genuine research for re-use (secondary analysis).	☐
4. I understand that my name/my organisation's name will not appear in any reports, articles or presentation without my consent.	☐
5. I understand that any interviews or focus groups will be audio-recorded and transcribed and that data will be protected on encrypted devices and kept secure.	☐
6. I understand that some of the classroom observations will be video-taped and transcribed and that data will be protected on encrypted devices and kept secure.	☐
7. I understand that data will be kept according to University guidelines for a minimum of 10 years after the end of the study.	☐
8. I agree to take part in the above study.	☐

_________________________ _______________ ________________
Name of Participant Date Signature

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Signature of Researcher /person taking the consent_________________________ **Date** __________ Day/month/year

One copy of this form will be given to the participant and the original kept in the files of the researcher at Lancaster University

Appendix Eleven: Consent Form- Parents

CONSENT FORM- Parents

Project Title: Establishing Universal Design Principles for an IB-FC model (FC design model for inquiry-based learning) in Primary Education in Cyprus- An action research based on multiple case study

Name of Researcher: Maria Loizou Raouna
Email: mariaraouna@gmail.com

Please tick each box

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily	☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time during my participation in this study and within 6 weeks after I took part in the study in the form of implementing the model, without giving any reason. If I withdraw within these 6 weeks during implementation my data will be removed.	☐
2. If I am participating in the focus group I understand that any information disclosed within the focus group remains confidential to the group, and I will not discuss the focus group with or in front of anyone who was not involved unless I have the relevant person's express permission	☐
3. I understand that any information given by me may be used in future reports, academic articles, publications or presentations by the researcher/s, but my personal information will not be included and I will not be identifiable. Fully anonymised data will be offered to LU institutional data repository and will be made available to genuine research for re-use (secondary analysis).	☐
4. I understand that my name will not appear in any reports, articles or presentation without my consent.	☐
5. I understand that any interviews or focus groups will be audio-recorded and transcribed and that data will be protected on encrypted devices and kept secure.	☐
6. I understand that data will be kept according to University guidelines for a minimum of 10 years after the end of the study.	☐
7. I agree to take part in the above study.	☐

________________________ _______________ ________________

Name of Participant Date Signature

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Signature of Researcher /person taking the consent________________________ **Date** __________ Day/month/year

One copy of this form will be given to the participant and the original kept in the files of the researcher at Lancaster University

Appendix Twelve: Consent Form-Students

CONSENT FORM- Students

Lancaster University

Project Title: Establishing Universal Design Principles for an IB-FC model (FC design model for inquiry-based learning) in Primary Education in Cyprus- An action research based on multiple case study

Name of Researcher: Maria Loizou Raouna
Email: mariaraouna@gmail.com

Please tick each box

1. I confirm that I have read and understand the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily	☐
2. I understand that my child's participation is voluntary and that I am free to withdraw him/her at any time during his/her participation in this study and within 6 weeks after he/she took part in the study in the form of implementing the model, without giving any reason. If I withdraw him/her within these 6 weeks during implementation my data will be removed.	☐
3. If my child is participating in the focus group I understand that any information disclosed within the focus group remains confidential to the group.	☐
4. I understand that any information given by my child may be used in future reports, academic articles, publications or presentations by the researcher/s, but my child's personal information will not be included and he/she will not be identifiable. Fully anonymised data will be offered to LU institutional data repository and will be made available to genuine research for re-use (secondary analysis).	☐
5. I understand that my child'a name will not appear in any reports, articles or presentation without my consent.	☐
6. I understand that any interviews or focus groups will be audio-recorded and transcribed and that data will be protected on encrypted devices and kept secure.	☐
7. I understand that some of the classroom observations will be video-taped and transcribed and that data will be protected on encrypted devices and kept secure.	
8. I understand that data will be kept according to University guidelines for a minimum of 10 years after the end of the study.	☐
9. I agree for my child to take part in the above study.	☐

______________	______________	______________	______________
Name of Student	Date	Name of Parent	Parent's Signature

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

Signature of Researcher /person taking the consent__________________________ **Date** ___________ Day/month/year

One copy of this form will be given to the participant and the original kept in the files of the researcher at Lancaster University

Appendix Thirteen: Research Presentation to Parents

IB FC

Flipped Classroom model for Inquiry Based learning

Μοντέλο Αντεστραμμένης Τάξης για Διερευνητική Μάθηση

The Universal Design Principles of a Flipped Classroom Model for Inquiry-Based Learning

Researcher: *Maria Loizou Raouna*

PhD Candidate: E-Research and Technology-Enhanced Learning

Lancaster University

Research aim:

This qualitative study will explore the basic universal design principles of an IB-FC model (a Flipped Classroom (FC) design model for Inquiry-Based Learning) in primary school settings as **an instructional model which aims at leveraging technology-enhanced instruction outside the classroom time, thus maximizing student engagement and learning during class time** (Mazur, Brown, & Jacobsen, 2015).

Research Questions

RQ1: What are the **experiences of teachers, students and parents** in different IB-FCs in Cyprus primary school context?

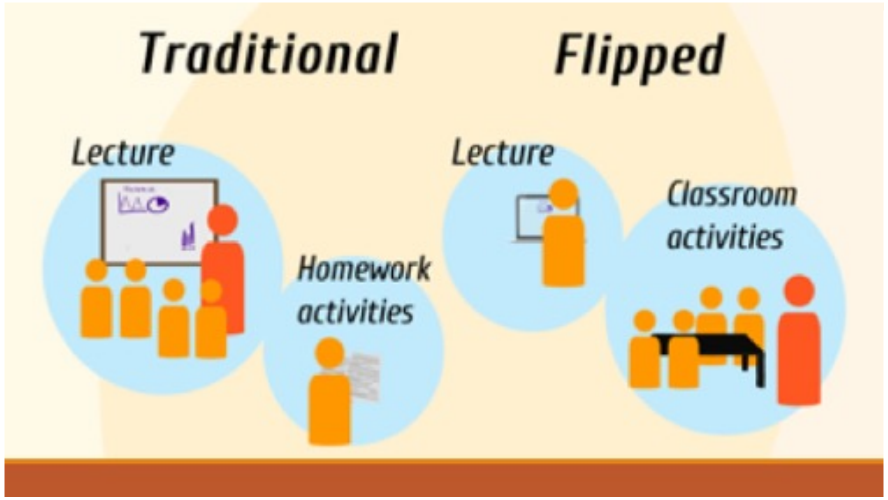
RQ2: What are the **overall perceptions of teachers, students and parents** on implementing a IB-FC model in different subject matters in Cyprus primary school context (benefits, challenges, and limitations)?

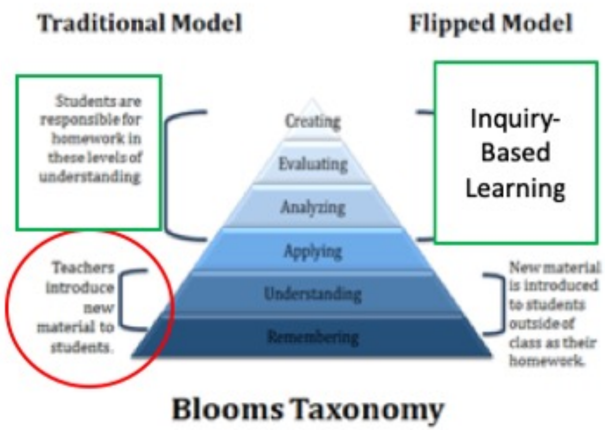
RQ3: What are the **universal design principles for an effective implementation of a IB-FC model** in Cyprus primary school context across different subject matters?

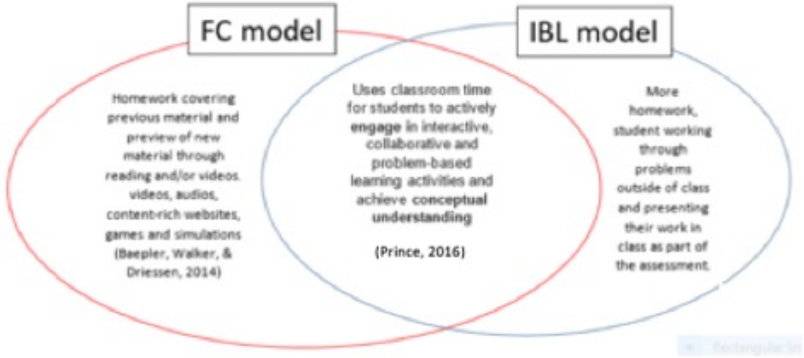
What is flipped learning?

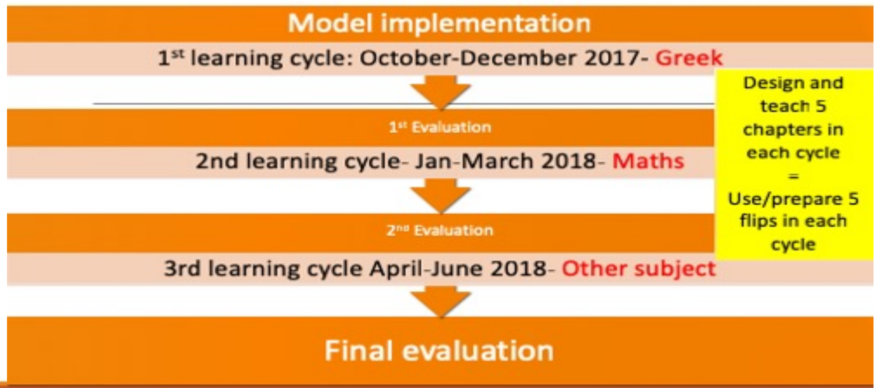
Flipped learning

- An **innovative approach** to teaching and learning (e.g. Baker, 2000; Bergmann & Sams, 2012; Young, Hughes, Inzko, Oberdick, & Smail, 2011),
- It is the model where the traditional lecture material is **transferred outside the classroom** (in alternative formats, mainly video-tutorials, readings, screencasts), allowing **class time to be used for inquiry-based learning** (Bergmann, & Sams 2015; Love et al., 2015; Ullman, 2013)









Which are my responsibilities as a teacher?

Data collection tools

In each chapter

Teacher reflection	Students' reflections/self-assessment	Classroom observations and video-taping
Teacher interviews	Student interviews	Parent interviews

At the end of each learning cycle, i.e 3 in total

Research Participants

- **10 experienced, innovative primary school teachers** in Cyprus (i.e. 10 primary schools)
- Approximately **200 students** of all grades
- Approximately **200 parents** (one parent in each family)

What if some parents do not agree for their children to participate

Those students will not be observed, video-taped or interviewed.

You can still use any teaching methodology as a teacher, i.e. you can still implement the research model!

Which is the learning process?

In-class (attract interest) - **Time: 10'**

At home (flip, entrance ticket, forums, questions, notes, chat etc). **Time: 30'- several days**

In class (initial lecture 10', IBL activities, assessment-exit ticket, final lecture 5') **Time: 80'- multiple periods**

At home (self-assessment/reflection 10', e-portfolio final page) **Time: 30'-several days**

Follow the lesson template uploaded on Moodle

Πρότυπο Διαδικτυακό Σχολείο

https://www.protyposxoleio.com

What is a flip?

- Video-tutorial prepared by the teacher
- Video-tutorial ready online
- Other learning material: presentations, readings, multimedia etc.

Benefits of Flipped Classroom (FC)

The FC instructional model has received a growing level of research attention given the promising **results that showcase its** capacity to enhance teaching practice and deliver (among others) **better students' cognitive learning outcomes.**

(Giannakos, Krogstie, & Chrisochoides, 2014).

Benefits to teachers and students

As direct teaching is transferred at home, extra time freed in class is used for IBL activities and more time with the teacher, i.e.

1.Flipping helps struggling students

2. Flipping helps students of all abilities excel

3. Flipping increases student-teacher interaction

4. Flipping allows teachers to know their students better

5. Flipping allows for real differentiation

6. Flipping changes classroom management

7.Flipping changes the way we talk to parents

(Bergman & Sams, 2008; Brunsell & Horejsi, 2013; DeLozier & Rhodes, 2016)

Benefits to parents and their children

1. Flipped Classes increase Student-Teacher Interaction
2. Flipped Classes help you help your child
3. It will decrease the anxiety of your child over homework
4. Your child will be able to pause and rewind their teacher
5. Flipped Classes lead your child to deeper and authentic learning (Inquiry-based learning), i.e. promote critical thinking, creativity etc.

(e.g. Jungić, Kaur, Mulholland, & Xin, 2015; Mazur et al., 2015)

Pilot Implementation

[redacted]ry School,

Nicosia

School year: 2016-17

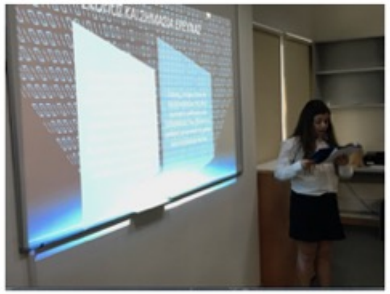
Educator: Maria Loizou Raouna

Pilot implementation: Development of Presentation Skills

Presentation to the Cyprus Research Promotion Foundation

Presentation at the University of Cyprus- ICT postgraduate students

Presentation to the European University Cyprus- medical school



Appendix 14: Orchestration Routines

Basic IB-FC Orchestration Routines Arising from Research Findings

Orchestration Routines	OR.1: Your VLE should have all the instructions, content and notes students need.
	OR.2: Organize online content and activities
	OR.3: Set out a plan with the sequence of activities.
	OR.4: Use the classroom Drive account for sharing material (students with students, teacher with students) and taking notes.
	OR.5: Timings: Monitor activity timings and Moodle correction timings.
	OR.6: Make good use of in-class time for downloading software.
	OR.7: Handle loud students during silent activities.
	OR.8: Decide on team creation.
	0R.9: Monitor student work: e.g. use signals.
	OR.10: Remind the students to save their work.
	0R.11: Handle accounts and devices: (a) Create common classroom accounts or use the Google account to sign up/log in to other websites; (b) Never leave a student without a device; (c) Students should turn on their devices and out them to sleep according to teachers' instructions; (d) Students may use two devices in pairs and work on a different pace on each to monitor their work better; (e)Students should not use the devices during breaks; (f) Students should always sigh-out from all accounts and out their tablets away before leaving the class; (g) The devices should be charged on time.
	OR.12: Use a badge (on the VLE) or any other rewarding/penalty system.
	OR.13: Use in-flip stations for lower primary students or students who do not watch the flips at home.
	OR.14: Ask students to bring in headphones for in-flip time.
	OR.15: Set up a question bank at the time of the lesson.
	OR.16: Use the VLE to upload 'extension' activities (for the students who complete their work before others).
	OR.17: Use internet-safety filters.
	OR.18: Gradually implement